US-60/Grand Avenue

Corridor Optimization, Access Management, and System Study (COMPASS)

Loop 303 to Interstate 10

Technical Memorandum 5
Concept Development and Evaluation

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June 2014

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List of Abbreviations

ACS	American Community Survey
ADA	Americans with Disabilities Act
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
AFB	Air Force Base
AMP	Access Management Plan
APS	Arizona Public Service
BRT	Bus Rapid Transit
COMPASS	Corridor Optimization, Access Management Plan, and System Study
D&R	Dial-A-Ride
DAR+	Dial-A-Ride Plus
DEUR	Declaration of Environmental Use Restriction
DU	Dwelling Unit
dnl	decibel noise level
El Mirage	City of El Mirage
FCDMC	Flood Control District of Maricopa County
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
GL	Grand Avenue Limited
Glendale	City of Glendale
GUS	Glendale Urban Shuttle
HCT	High Capacity Transit
I-10	Interstate 10 Papago Freeway
I-17	Interstate 17 Black Canyon Freeway
IPaC	Information, Planning, and Conservation System
ITS	Intelligent Transportation System
LRT	Light Rail Transit
LOS	Level of Service
LQG	Large Quantity Generators
LRT	Light Rail Transit
MAG	Maricopa Association of Governments
MOC	Municipal Operating Center
MP	Milepost
MUD	Median Urban Diamond
NHS	National Highway System
NRHP	National Register of Historic Places
O&M	Operation and Maintenance
Peoria	City of Peoria
Phoenix	City of Phoenix
Q/LOS	Quality/Level of Service

QOS	Quality of Service
RIRO	Right-In Right-Out Only
R/W	Right-of-Way
RPTA	Regional Public Transportation Authority
RTP	Regional Transportation Plan
SMART	Systematically Managed Arterial
SR-101L	State Route 101 Loop Agua Fria Freeway
SR-303L	State Route 303 Loop Bob Stump Memorial Parkway
SRP	Salt River Project
ST–LUIS	Sustainable Transportation and Land Use Integration Study
Surprise	City of Surprise
TI	Traffic Interchange
US-60	United States Route 60
USC	Upstream Signalized Crossover
USFWS	United States Fish and Wildlife Service
UST	Underground Storage Tank
Youngtown	Town of Youngtown

1.0 Introduction

The US-60/Grand Avenue COMPASS – Loop 303 to Interstate 10 is being conducted by the Maricopa Association of Governments in order to identify a long-term solution for accommodating travel demand and adjacent property access, establish operating principles to improve the effectiveness of traffic operations, and prepare an Access Management Plan that will provide a detailed milepost-by-milepost description of adjacent property access along the US-60/Grand Avenue corridor.

A Partnering Charter was signed on February 22, 2012, by the political leadership of the communities within the US-60/Grand Avenue COMPASS corridor. The outcomes of this technical study will address the following goals that were identified in the charter:

- Cooperatively create an overall vision for the US-60/Grand Avenue Corridor that embraces the important regional function of Grand Avenue as a significant high capacity, multimodal corridor and that can recognize the unique character of different sections of the corridor and the communities it passes through.
- Cooperatively define the operational character for the US-60/Grand Avenue Corridor that will enhance economic development, maintain accessibility to adjacent land uses, improve traffic operations, and reduce highway and rail conflicts.
- Establish an access management system that provides an efficient means to accommodate intersecting roadways and access to and from adjacent properties. After the system is recommended and agreed upon, each stakeholder will incorporate the principles and recommendations into their transportation, economic development and community development.
- Develop guidelines for signage, landscaping and aesthetic treatments along the corridor recognizing the different communities along the corridor.
- Work together to provide the affected stakeholders, including daily commuters, local residents, and adjacent property owners and users with information about the project and opportunity to contribute to the study's outcome and recommendations.

1.1. Purpose of This Paper

This paper is the fifth Technical Memorandum in a series of US-60/Grand Avenue COMPASS documents; it was prepared to document the development, evaluation, and recommendations for the corridor concept(s) that are advancing to the next steps of the US-60/Grand Avenue COMPASS project.

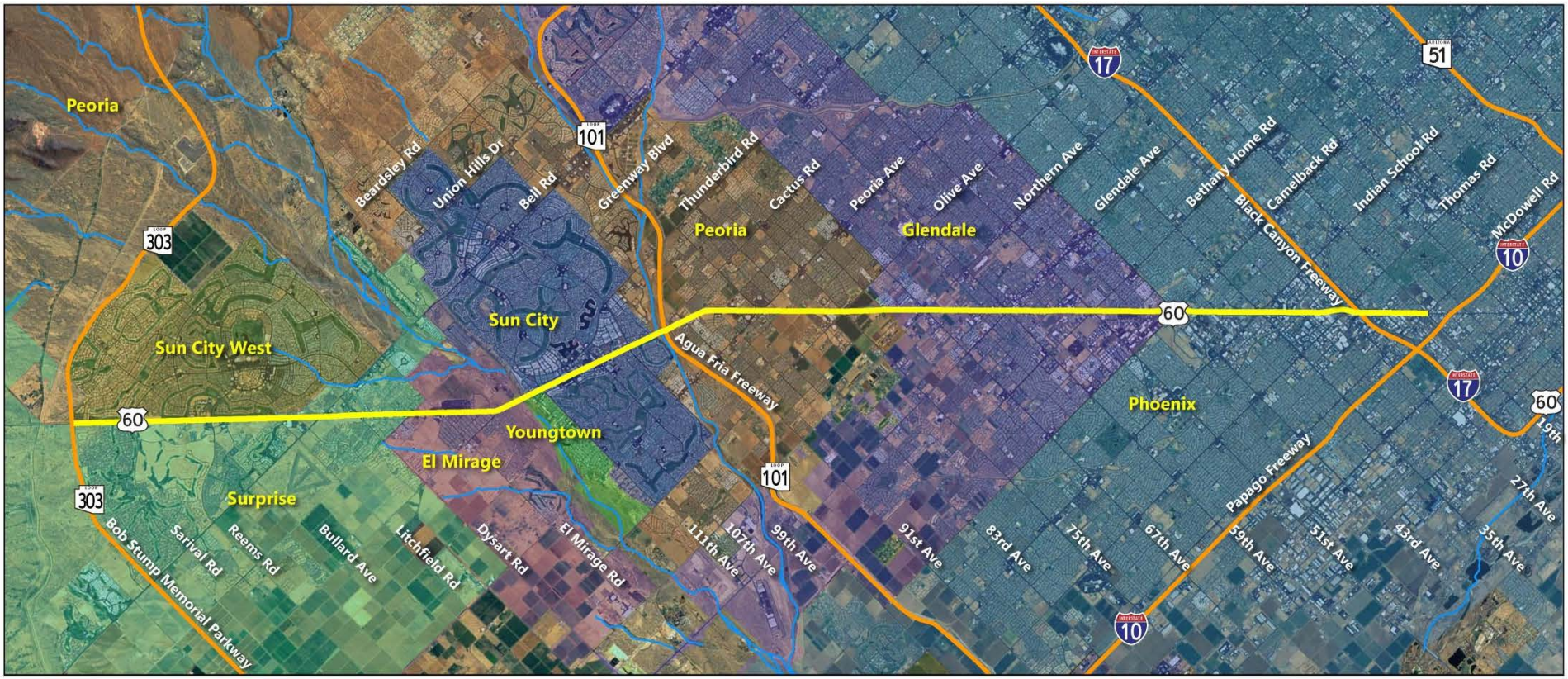
1.2. Study Area

The US-60/Grand Avenue COMPASS corridor begins at the TI with SR-303L in the City of Surprise, Arizona, at US-60 reference marker 138.051 (expressed in miles) and ends at the Willetta Street intersection in the City of Phoenix, Arizona, at US-60X reference marker 161.880 (expressed in miles). The corridor is oriented northwest-southeast, and passes through portions of the City of Surprise, City of El Mirage, Town of Youngtown, City of Peoria, City of Glendale, City of Phoenix, and unincorporated Maricopa County.

US-60/Grand Avenue is a regionally significant six-lane roadway that is part of the NHS. It serves as a vital link connecting four important regional freeways: I-10, I-17, SR-101L, and SR-303L (***Figure 1***). US-60/Grand Avenue extends north to the Town of Wickenburg, where it turns west to western Arizona and California. In Wickenburg, US-60/Grand Avenue connects with US-93, which is the primary link to northwestern Arizona and Las Vegas from the Phoenix metropolitan area.

The US-60/Grand Avenue corridor includes the BNSF Railway. The BNSF Railway tracks run the full length of the corridor, parallel and adjacent to the roadway. They are situated along the roadway's southern edge south of Olive Avenue, and the northern edge to the north.

Figure 1 – Study Area



Legend
- US-60/Grand Ave COMPASS Corridor
- Freeway
- Streams/Washes

US-60/Grand Avenue: Loop 303 to Interstate 10
COMPASS
6/25/2013
0 1.5 3 6 Miles

2.0 US-60/Grand Avenue COMPASS Vision

A key tenant of the US-60/Grand Avenue COMPASS Charter was the development of a vision statement to serve as a framework for enhancing regional mobility while protecting the unique character of the US-60/Grand Avenue Corridor and the communities it serves. A draft Vision was developed by the study team based on input received from agencies along the corridor, as well as input received from stakeholder focus groups held to discuss economic development and freight interests. The draft Vision was distributed to the leadership and staff of the agencies along the corridor, and was revised based on their input. Additional input was solicited during one-on-one meetings with key landowners and at two public houses held in June, 2014.

The Vision starts with a statement articulating the desired approach to implementing multimodal transportation for the US-60/Grand Avenue corridor and is framed by nine guiding principles that characterize the shared ambitions and objectives of future corridor improvements.

Vision US-60/Grand Avenue COMPASS

Historically, the US-60/Grand Avenue corridor has played an important role in connecting northwest Valley communities, providing connections to six downtowns, and serving as an economic driver moving freight and goods by roadway and freight rail. The US-60/Grand Avenue corridor is projected to experience growth in population and employment over the next 25 years requiring a regional, integrated, and multimodal approach to providing transportation in the West Valley. This vision sets in motion an integrated approach to multimodal transportation in the US-60/Grand Avenue corridor that respects individual characteristics of each city and provides alignment of the consistent complete streets goal that each of the cities along the corridor has adopted.

2035 Vision

US-60/Grand Avenue serves as a high capacity, multimodal state highway corridor that provides safe and reliable connectivity to and through the West Valley. This is facilitated by employing a variety of solutions—including roadway improvements, commuter rail and other transit modes—in an access-managed corridor to provide efficient movement of people and goods. The corridor is essential for economic vitality, contributing to the vibrancy of Surprise, El Mirage, Youngtown, Peoria, Glendale, Phoenix, and unincorporated Maricopa County, and recognizes the unique character of each community it traverses.

Guiding Principles of the Vision Statement include:

- ***Preserve and Promote Transportation Capacity*** – Implement operational improvements, access management, and the effective use of technology and information to improve upon the efficient movement of goods and people within the corridor and maximize available potential roadway capacity.
- ***Integrate Multimodal Transportation*** – Use innovative transportation systems to develop a multimodal network that accommodates commuter-based, high-capacity transit, such as

commuter rail within the BNSF Railway corridor and/or bus rapid transit; augment the network with local and regional bus transit service and a well-connected local and regional roadway system.

- ***Support and Enhance Economic Growth*** – Enhance the transportation system to serve activity centers, link land use and transportation effectively, and support regional/local economic growth opportunities.
- ***Advance Safety and Security*** – Design, build, operate, and maintain a multimodal transportation system that is safe and secure, reducing the risk of property damage and injury/fatality as well as limiting conflicts between modes in the corridor.
- ***Establish a Unified and Coordinated Approach to Land Use Access*** – Develop an integrated and well coordinated approach to managing private property access to US-60/Grand Avenue for the benefit of all corridor users in the Northwest Valley, and secure commitment of all local agencies along the corridor.
- ***Promote a Transit-Supportive Development Pattern*** – Encourage a higher density, well-connected mixed use development pattern within the corridor at activity centers to support corridor transit implementation and success.
- ***Encourage Coordinated Aesthetics*** – Develop urban design improvements (signage, landscaping, lighting, and aesthetic treatments) that recognize the uniqueness and heritage of each community while providing a consistent corridor theme.
- ***Connect Communities in a Cost Effective Manner*** – Promote and provide an integrated, cost effective transportation system that efficiently moves people and freight while connecting communities and activity centers throughout the Northwest Valley.
- ***Revise the Partnering Charter to Extend Through Implementation*** – Collaboratively create and adopt an implementation partnering agreement that defines how the US-60/Grand Avenue corridor is developed, including a corridor-based funding strategy.

3.0 Corridor Concept Development

The corridor concept development and evaluation process included the exploration of a wide range of ideas. The process was engaging throughout and sought input from the US-60/Grand Avenue charter agencies, stakeholders, and the general public.

3.1. Charter, Management, and Planning Partners Input

Three key groups have led the US-60/Grand Avenue COMPASS project and have met numerous times together and in one-on-one settings throughout the project duration to direct, advise, and assist the study team.

- Charter Partners – Consists of the elected officials from the chartering agencies;
- Management Partners – Consists of the managers from the chartering agencies; and
- Planning Partners – Consists of agency representatives and staff.

Upon project initiation, the study team met with each agency along the corridor. The following are a few highlights of themes heard from those meetings.

- Improve travel time by optimizing and simplifying traffic signals operation.
- Improve access control and reduce conflict points.
- Explore and incorporate innovative transportation solutions.
- Continue implementation of planned traffic interchanges and consider new traffic interchanges.
- Eliminate six-leg intersections.
- Accommodate future growth and encourage development opportunities.
- Develop aesthetic policies, including uniformity or character areas, way-finding signage and branding.
- Address railroad interaction at new and existing crossings.
- Consider access to transit.

3.2. Study Area Features and Peer Corridor Considerations

The corridor concepts were developed in light of the existing conditions documented in Technical Memorandum 1, relevant studies and projects documented in Technical Memorandum 2, similar corridors studied in Technical Memorandum 3, and access management considerations documented in Technical Memorandum 4. A summary of sources used is included in ***Appendix TM5-1***. Key influences derived from these Technical Memorandums are summarized below.

- The US-60/Grand Avenue COMPASS study area has been the subject of 54 completed studies and projects, including 40 roadway related projects/studies and 24 transit related projects/studies. There is substantial interest in the corridor, evidenced by the signing of the Partnering Charter at the outset of this study. The character of the corridor varies throughout, as does its current function and future documented interests.
- The shift in focus over time for US-60/Grand Avenue to function as an arterial type of corridor heightens the importance of each access management decision made on the corridor, and how transit can ultimately be folded into the functionality to improve person-moving capacity and quality.

- Land use varies with more residential uses in Surprise, and downtown uses in Glendale and Peoria transitioning to industrial and employment uses in the Phoenix portion. US-60/Grand Avenue connects six downtown areas, with land use plans having provisions for transit-oriented development. Current transportation patterns, however, are automobile intensive.
- Special consideration will be needed for potential environmental impacts, especially environmental justice, natural resources, contaminated sites, and underground storage tanks.
- Roadway and traffic control elements are inconsistent throughout the corridor, where US-60/Grand Avenue is not configured with the priority of a regional route. For example, side streets are given priority at intersections and in traffic operations in many locations. Access varies throughout without an established access management plan. There are sections that resemble freeways while in other areas, there are numerous access points as would be expected on a collector or a local street.
- Railroad, utilities and right-of-way constraints will likely impact future recommendations.
- Traffic operations will need to be addressed in future years, including the mobility of people and freight. Key locations to focus on include the segments from SR-303L to Bell Road, Thunderbird Road to SR-101L, and Northern Avenue to Indian School Road. Many of these same locations also exhibit higher crash rates than the remainder of the corridor.
- The primary use of US-60/Grand Avenue appears to be local travel with modest commuter use based on travel data.
- Multimodal services are limited in the study area. Future additional transit services will need to consider potential connecting/supporting networks.

Key objectives identified in Technical Memorandums include:

- Access management strategies to foster a balance between improved safety conditions and attracting new development;
- Geometric improvements (spot locations);
- Driveway consolidation (driveway density reduction – spot locations);
- Overlay zoning districts that correlate to the desired land uses and densities (specific locations or corridor);
- Transit stop accessibility (corridor level);
- Ordinance development (municipal); and
- Develop a Corridor Charter supported by Council Resolutions by all corridor municipalities that would provide a framework for the common understanding of issues and problems, document a set of goals, objectives, and define an agreed upon direction.

3.3. Planning and Engineering Considerations

Based on input from corridor stakeholders and technical investigation simplified traffic signal phasing and High Capacity Transit (HCT) technologies were underlying themes in the development of the corridor concepts.

3.3.1. Traffic Signal Phasing

The US-60/Grand Avenue southwest-northeast alignment is skewed relative to the Phoenix metropolitan north-south and east-west arterial street grid system throughout the length of the study area. The result is five- and

six-leg intersections, grade separated arterial interchanges, and a multitude of oblique, signalized and stop controlled intersections. Many of the traffic signals have complex timing and patterns.

In general terms, a traffic signal phase, or a "green light," allows a traffic movement to occur. For example, a basic four-leg intersection typically has a four-phase traffic signal, as illustrated in ***Figure 2***. Each additional approach to an intersection will typically need additional traffic signal phases to process the additional traffic movements. A six-leg intersection could require at least six phases to allow all traffic movements, as illustrated in ***Figure 3***. The time it takes for a traffic signal to rotate through each traffic signal phase one time is the traffic signal cycle time. Additional traffic signal phases typically require longer traffic signal cycle times. This fundamental concept has a substantial bearing on the operational efficiency of an intersection, as well as the coordination with other signalized intersections and traffic progression in a corridor.

Figure 2 – Four-Phase Signal Cycle

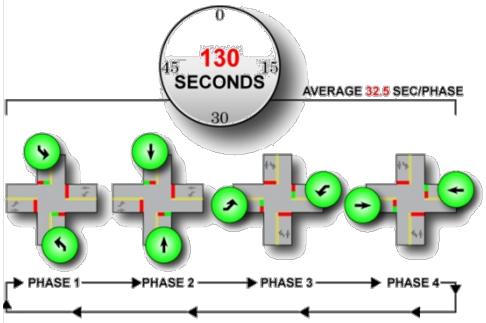
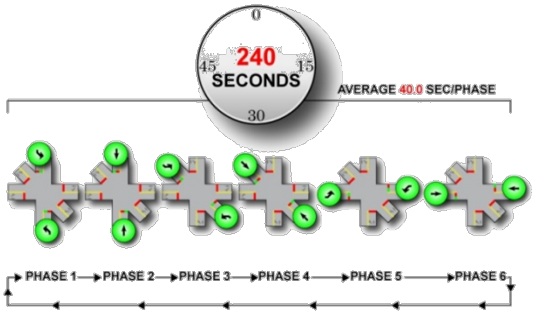


Figure 3 – Six-Phase Signal Cycle



Two TI concepts were developed to reduce traffic signal phases within the US-60/Grand Avenue corridor: the Median Urban Diamond (MUD) TI illustrated in **Figure 5** and Upstream Signalized Crossover (USC) intersection illustrated in ***Figure 4***. The MUD concept is based on a traffic signal with three phases. The USC concept is based on a traffic signal with two phases.

Figure 5 – Median Urban Diamond

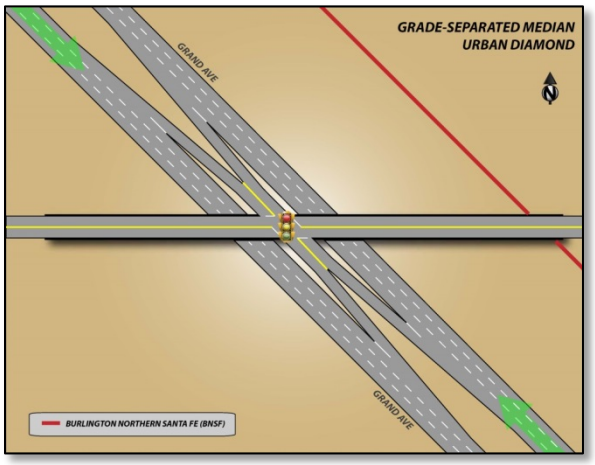
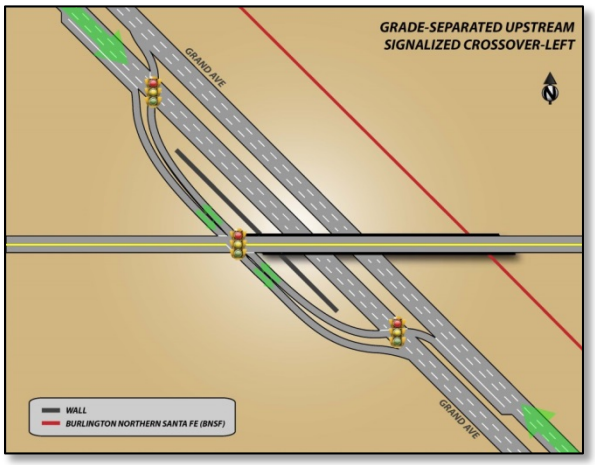


Figure 4 – Upstream Signalized Crossover



3.3.2. HCT Technologies

In addition to the region's traditional Supergrid Bus system, three transit technologies new to the US-60/Grand Avenue corridor were generally considered: Commuter Rail, Bus Rapid Transit (BRT), and Light Rail Transit (LRT). The *MAG Regional Transit Framework Study* (January 2010) outlines the fundamentals of each technology in a matrix, which is presented in ***Appendix TM5-2***, and defines them as follows:

- *Commuter Rail* – Local and regional passenger train service between a central city, its suburbs and/or another central city, operating primarily during commuting hours. Designed to transport passengers from their residences to their job sites. Differs from rail rapid transit in that the passenger cars generally are heavier, the average trip lengths are usually longer, and the operations are carried out over tracks that are part of the railroad system.
- *BRT* – Combines the quality of rail transit and the flexibility of buses. It can operate on exclusive transitways, HOV lanes, expressways, or ordinary streets. A BRT system combines intelligent transportation systems technology, priority for transit, cleaner and quieter vehicles, rapid and convenient fare collection, and integration with land use policy.
- *LRT* – A type of electric rail system with a total passenger carrying capacity that is relatively "light" compared to heavy rail transit. Light rail may be on exclusive or shared right-of-way, high or low platform, multi-car trains or single cars, automated or manually operated. In generic usage light rail includes streetcars, trolley cars, and trams; in contemporary usage light rail refers to very modern and more sophisticated developments of these older rail modes.

4.0 Corridor Concepts

The input provided by stakeholders and research completed to date by the study team, coupled with the desired future vision of the corridor articulated by the Charter Partners, led to the development of the following four concepts for US-60/Grand Avenue:

- Red Concept – Continue Regional Transportation Plan (RTP) Improvements;
- Purple Concept – US-60/Grand Avenue Expressway;
- Blue Concept – Commuter Rail with Operational Improvements; and
- Green Concept – Other High Capacity Transit.

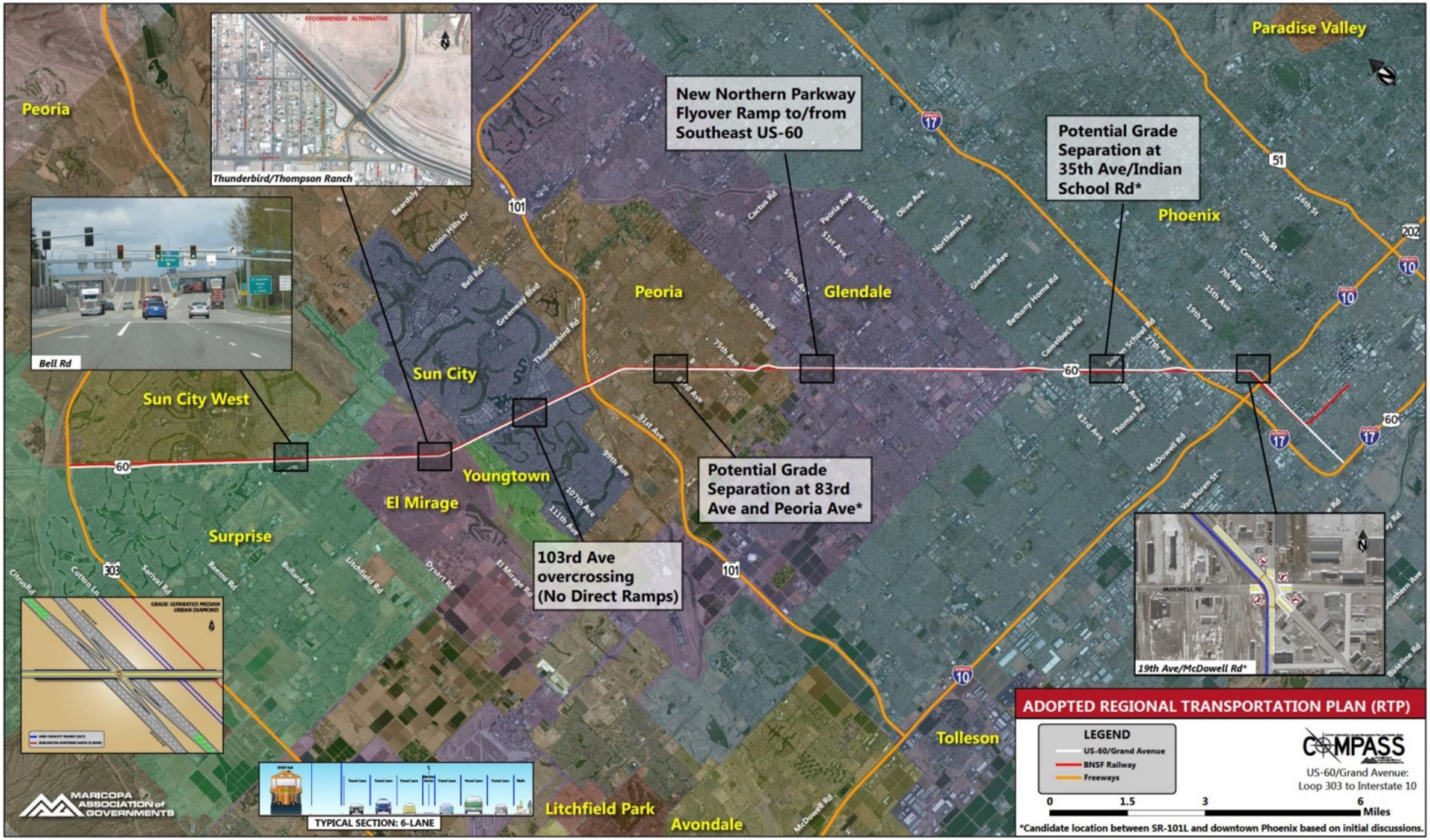
Planning level cost estimates were developed to provide an "order of magnitude" cost estimate for each corridor concept utilizing 2013 dollars. Potential right-of-way costs and operation and maintenance costs are not included in the estimates, unless stated otherwise. The planning level cost estimates include a contingency of 30%, and may vary depending on further investigation and development.

The following sections outline the main characteristics of each of the four corridor concepts.

4.1. Red Concept – Continue Regional Transportation Plan (RTP) Improvements

The Red Concept completes the programmed improvements, as identified through 2031, with no other substantial improvements in the corridor: it is essentially a "no-build" alternative. The Red Concept is illustrated in ***Figure 6*** and the proposed improvements are summarized below.

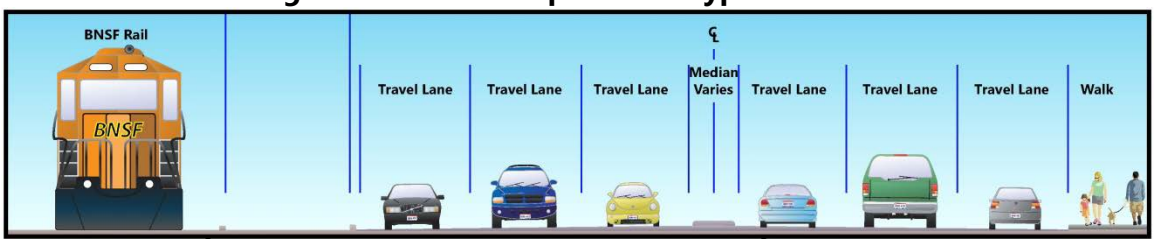
Figure 6 – Red Concept – Continue RTP Improvements



Roadway Characteristics

The Red Concept generalized corridor typical section is illustrated below in ***Figure 7***. It includes three lanes for each direction of travel and a varying width median, generally maintaining the existing configuration.

Figure 7 – Red Concept 6-Lane Typical Section



Graphic for illustrative purposes only - not to scale.

Three new major improvements are identified in the RTP between SR-303L and SR-101L:

- *Bell Road* – Grade separated traffic interchange where Bell Road goes over US-60/Grand Avenue;
- *Thunderbird Road* – At-grade intersection improvement; and
- *103rd Avenue* – Grade separated overpass where 103rd Avenue goes over US-60/Grand Avenue.

In addition, there are three grade separated TIs planned in the RTP between SR-101L and McDowell Road; however, the locations have not been identified. Candidate locations include:

- *83rd Avenue and Peoria Avenue* – Grade separated overpass or "cap" where US-60/Grand Avenue is depressed (below grade) under 83rd Avenue and Peoria Avenue;
- *Northern Parkway* – Flyover ramps for eastbound Northern Parkway to eastbound US-60/Grand Avenue and westbound US-60/Grand Avenue to westbound Northern Parkway;
- *35th Avenue/Indian School Road* – new grade separated connections for US-60/Grand Avenue; and
- *19th Avenue/McDowell Road* – grade separated TI where US-60/Grand Avenue goes over 19th Avenue and McDowell Road.

Transit Characteristics

No new transit investments are included with the Red Concept; however, additional services, such as BRT or Commuter Rail are not precluded if the Red Concept is implemented.

Planning Level Cost Estimate

The planning level cost estimate of the Red Concept is $160 million, reflecting the total programmed amount in the RTP. Currently, $63 million is funded and $97 million is included in Phase V of the RTP (currently unfunded).

General Considerations

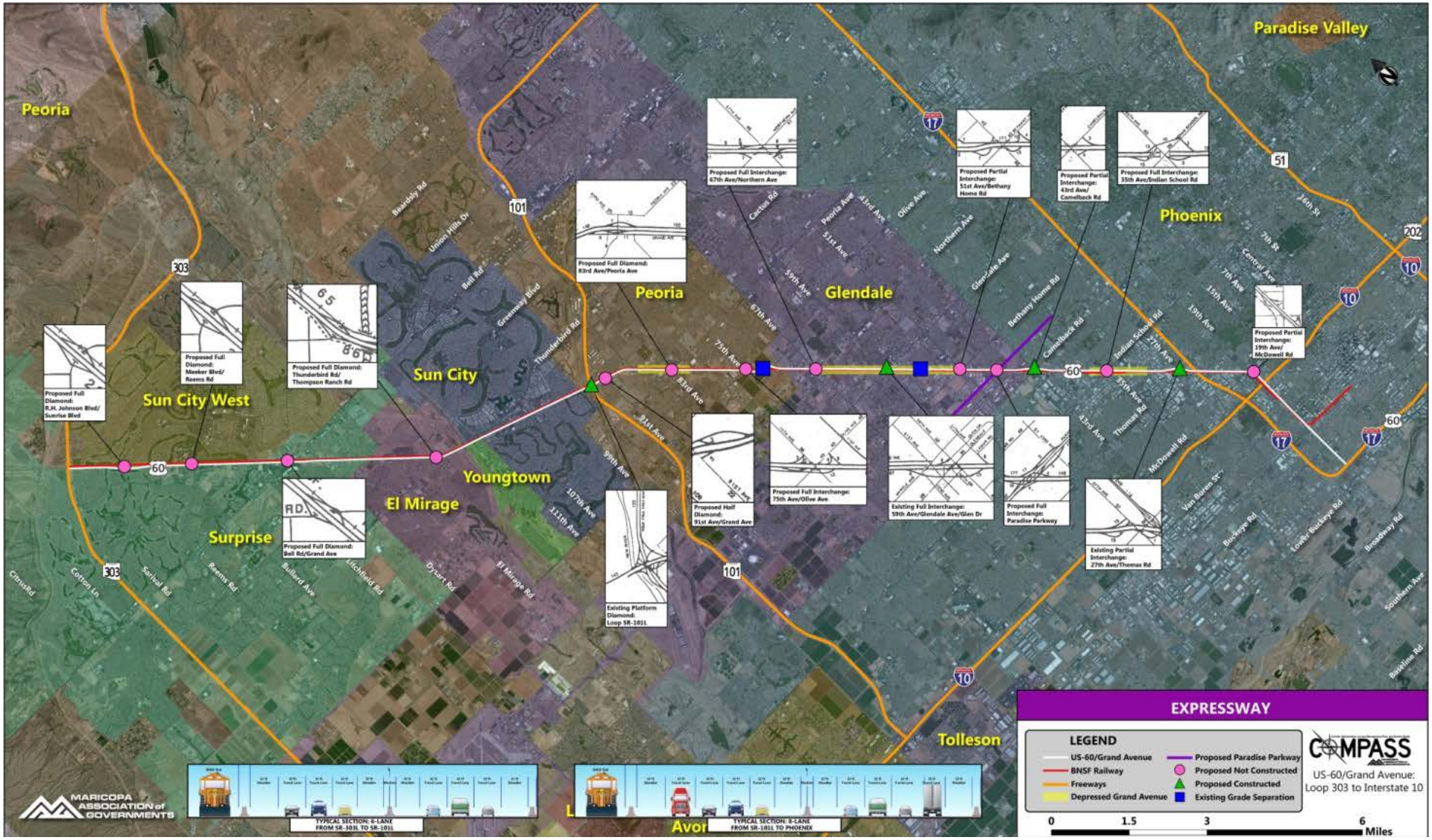
The Red Concept addresses some, but not all operational and accessibility issues in the corridor. Data provided by MAG indicated that the corridor could average approximately 72,000 daily person trips. This corridor concept would generally maintain its current character and would not likely substantially change economic development opportunities. Communities along the corridor are anticipating these improvements and are

generally prepared for their implementation, although this corridor concept would require general plan updates to remove plans for commuter rail. Additional funds, albeit limited compared to the other three corridor concepts, would be necessary.

4.2. Purple Concept – US-60/Grand Avenue Expressway

The Purple Concept substantially builds upon the Red Concept. It is based on Proposition 300, passed by the voters in Maricopa County in 1985, which included transforming US-60/Grand Avenue into a freeway. The "Grand Expressway" would have full access control from SR-303L to downtown Phoenix, including additional grade separated TIs. In 1989, traffic volume projections for 2010 were in excess of 170,000 vehicles per day per the *Grand Freeway Concept Finalization Report (*August 1989); currently, traffic volumes are about one-third of that projection in most segments of US-60/Grand Avenue. Proposition 300 also included the Paradise Parkway, another major traffic carrying facility that would affect US-60/Grand Avenue. It would run near Camelback Road, from SR-101L to SR-51; however, the Paradise Parkway was never constructed and is no longer under consideration. The Purple Concept is illustrated in ***Figure 8*** and the proposed improvements are summarized below.

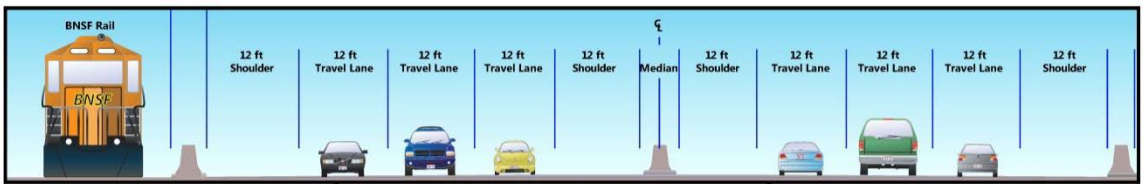
Figure 8 – Purple Concept – US-60/Grand Avenue Expressway



Roadway Characteristics

The Purple Concept generalized corridor typical section between SR-303L and SR-101L is illustrated below in ***Figure 9.*** It includes three lanes for each direction of travel and a median barrier. Barriers are also provided at the edges of the outside shoulders.

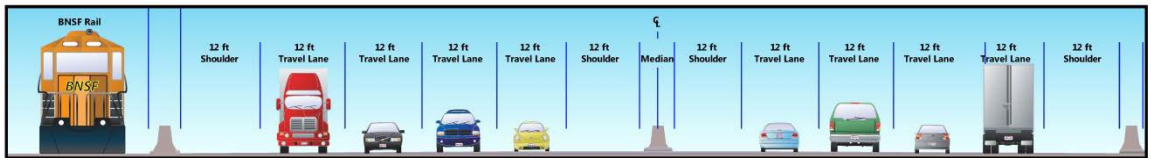
Figure 9 – Purple Concept 6-Lane Typical Section



Graphic for illustrative purposes only - not to scale.

The Purple Concept generalized corridor typical section between SR-101L and I-10 is illustrated below in ***Figure 10.*** It includes four lanes for each direction of travel and a median barrier. Barriers are also provided at the edges of the outside shoulders.

Figure 10 – Purple Concept 8-Lane Typical Section



Graphic for illustrative purposes only - not to scale.

Many new, or substantially improved, grade separated TIs were identified in the study area, including:

- R.H. Johnson Boulevard;
- Meeker Boulevard/Reems Road;
- Bell Road;
- Thunderbird Road/Thompson Ranch Road;
- 91st Avenue;
- Peoria Avenue/83rd Avenue;
- 75th Avenue/Olive Avenue;
- 67th Avenue/Northern Avenue;
- 51st Avenue/Bethany Home Road;
- 35th Avenue/Indian School Road; and
- McDowell Road/19th Avenue.

Implementation of the Grand Expressway generally eliminates at-grade intersections with major arterial streets and will require substantial acquisition of right-of-way.

Transit Characteristics

No new transit investments are included with the Purple Concept; however, additional services, such as BRT or Commuter Rail, are not precluded if the Purple Concept is implemented.

Planning Level Cost Estimate

The planning level cost estimate for the Purple Concept is $1,150 million. Right-of-way acquisition costs could exceed $1,250 million.

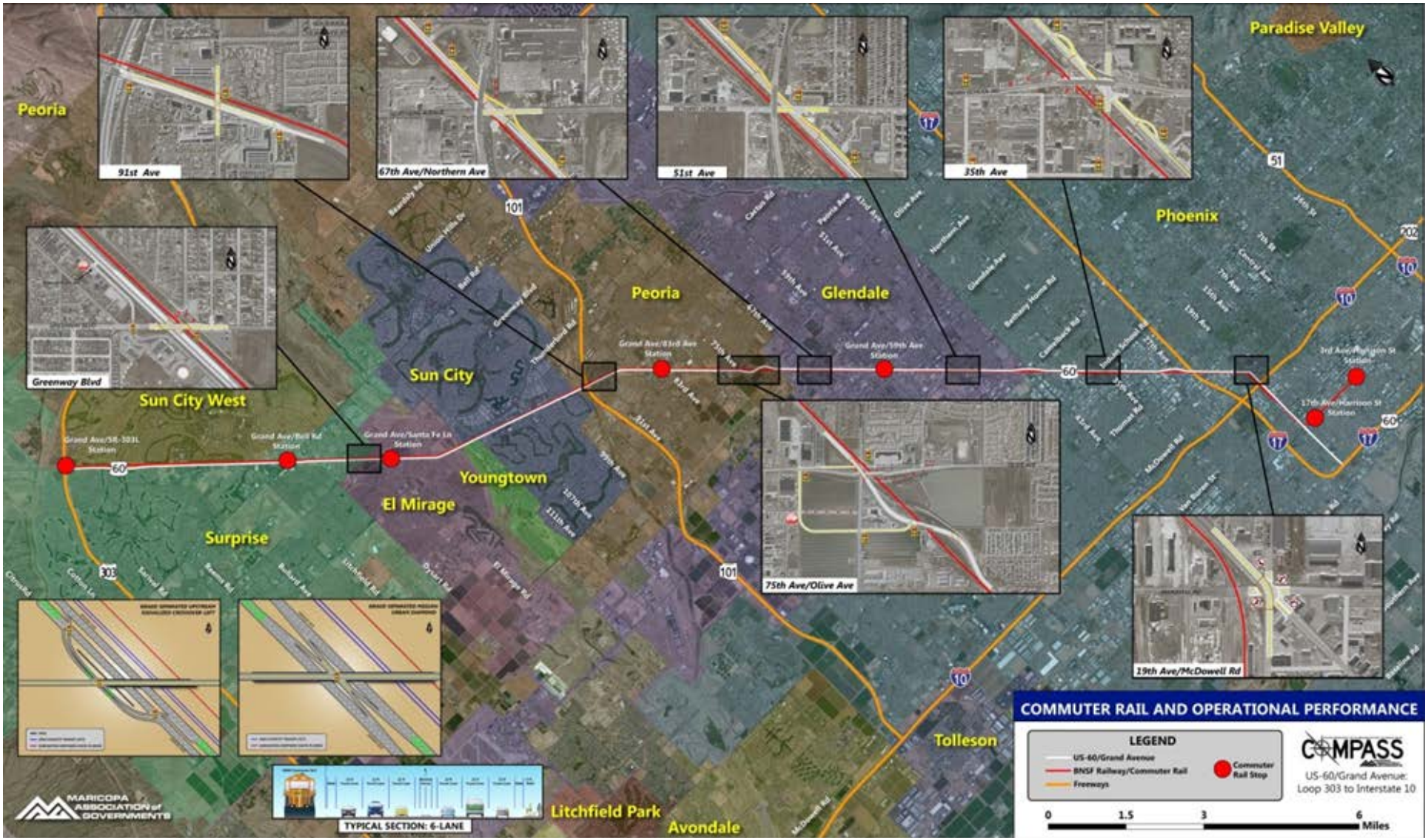
General Considerations

The Purple Concept improves vehicular operations within the corridor, but likely becomes unfriendly to pedestrians and bicyclists. Data provided by MAG indicated that the corridor concept could average approximately 96,000 daily person trips. This corridor concept expands the high-speed character of the corridor and changes economic development opportunities to be in contrast with general plans. This concept may impact downtown areas, including perceived barriers/divisions and it limits access to adjacent parcels. No significant transit investments, such as commuter rail, are considered in this concept. This concept requires additional major roadway infrastructure and therefore significant additional funds.

4.3. Blue Concept – Commuter Rail with Operational Improvements

The Blue Concept implements commuter rail in the US-60/Grand Avenue corridor, within the BNSF Railway right-of-way. The Blue Concept builds on the Red Concept from a roadway standpoint, but not to the same extent as the Purple Concept. Commuter rail would follow the recommendations of the MAG *Grand Avenue Commuter Rail Corridor Development Plan* (May 2010), which has already been accepted by the communities along the corridor and generally incorporated into their general plans. The Blue Concept is illustrated in ***Figure 11*** and the proposed improvements are summarized below.

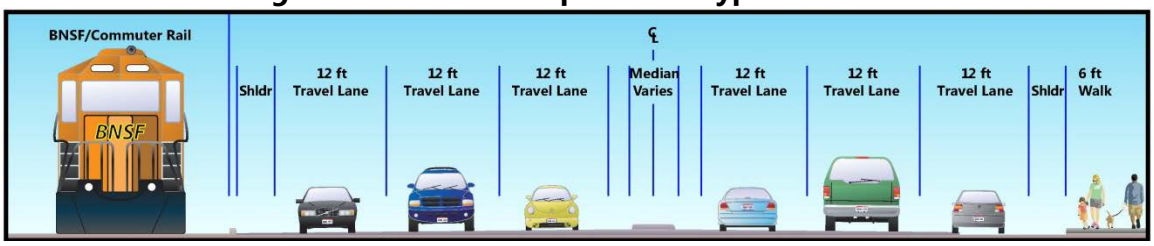
Figure 11 – Blue Concept – Commuter Rail with Operational Improvements



Roadway Characteristics

The Blue Concept generalized corridor typical section is illustrated below in in ***Figure 12.*** It includes three lanes for each direction of travel and a typical urban raised median.

Figure 12 – Blue Concept 6-Lane Typical Section



Graphic for illustrative purposes only - not to scale.

Several new, or substantially improved, grade separated TIs were identified in the study area, including:

- Bell Road;
- Greenway Boulevard;
- 91st Avenue;
- 75th Avenue/Olive Avenue;
- 67th Avenue/Northern Avenue;
- 51st Avenue/Bethany Home Road;
- 35th Avenue/Indian School Road; and
- McDowell Road/19th Avenue.

Transit Characteristics

Commuter rail operations would be conducted within the existing BNSF Railway right-of-way and would require substantial coordination with the BNSF Railway freight movements. Additional capital investments to the rail infrastructure would be necessary.

Commuter rail station spacing, or stop frequency, is typically greater than with other HCT technologies, providing fewer opportunities for stop locations. Within the study area, commuter rail stops are located at:

- *SR-303L* – North Surprise;
- *Bell Road* – Surprise;
- *Santa Fe Lane* – El Mirage;
- *83rd Avenue* – Peoria; and
- *59th Avenue* – Glendale.

Three potential service levels in the study area were explored by the *Grand Avenue Commuter Rail Corridor Development Plan*:

- Phase A – 30 minute headways during the peak and one off-peak roundtrip;
- Phase B – 30 minute headways during the peak and three off-peak roundtrips; and
- Phase C – 30 minute headways during the peak and 60 minute headways during the off-peak.

Phase A would have an initial service year starting before 2020 and Phase B occurring prior to 2030. Phase C, or build-out, would be in place between 2030 and 2040. Daily boardings are projected at 2,400, 2,800, and 5,000 for Phases A, B, and C, respectively. Prior to commuter rail implementation, BRT or other forms of HCT

may be introduced to allow the corridor to begin acclimation of its development patterns in favor of higher density employment and residential uses. This may increase ridership of commuter rail when implemented.

Planning Level Cost Estimate

The planning level cost estimate for the Blue Concept is $837 million; roadway capital costs are estimated at $403 million of that total. The *Grand Avenue Commuter Rail Corridor Development Plan* estimated transit capital costs for Phase A at $434 million, including $31 million for right-of-way, and O&M costs of $7.4 million annually. Phase B capital costs are $600 million with O&M costs of $10.8 million annually. Phase C capital costs are $701 million with O&M costs of $50 million annually.

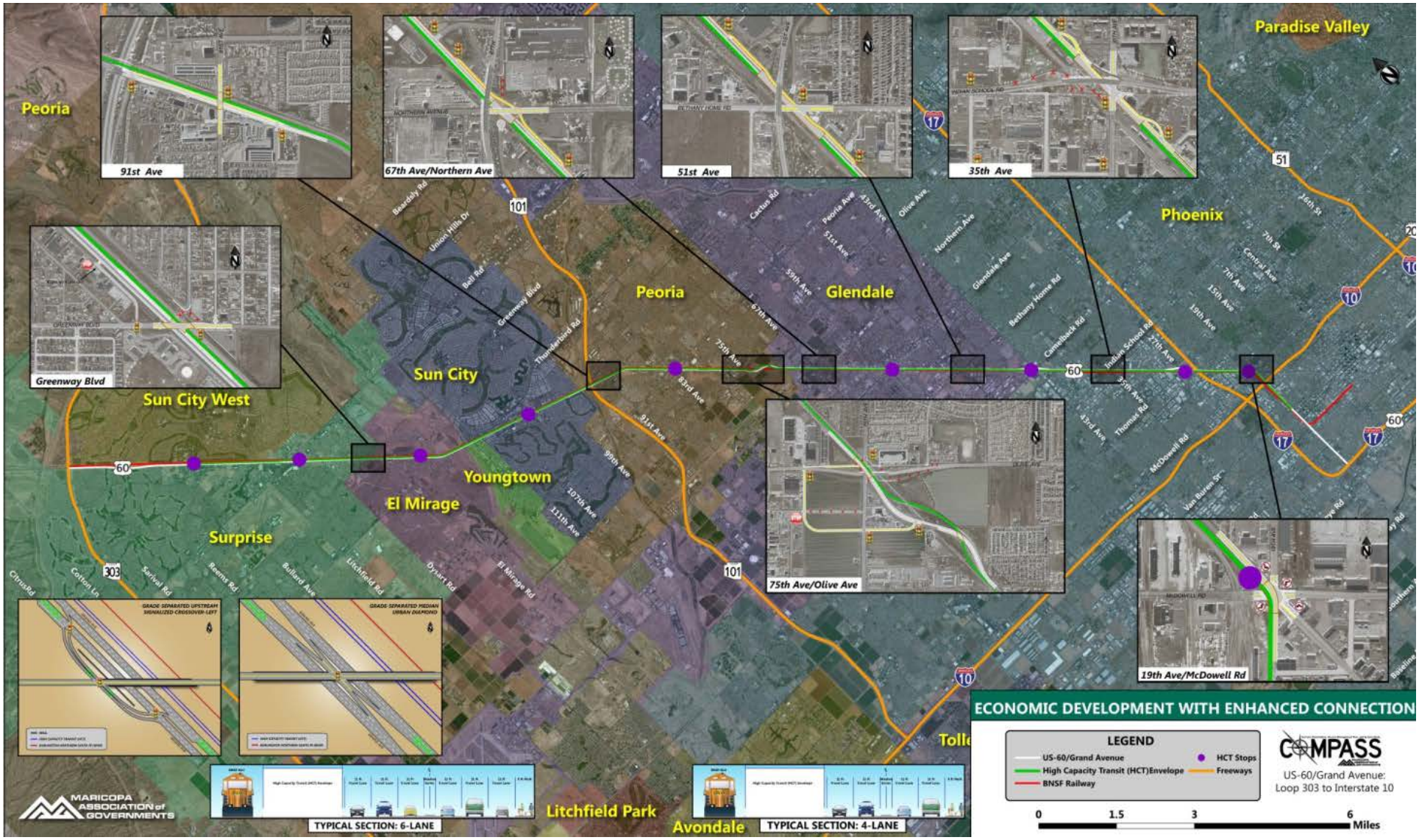
General Considerations

The Blue Concept improves vehicular operations and person throughput capacity. Data provided by MAG indicated that the corridor could average approximately 77,000 daily person trips. This concept would change the character along the corridor. The commuter rail aspect of this corridor concept is consistent with current general plans for communities along the corridor. Access to properties along US-60/Grand Avenue would be limited to mostly right-in right-out access. Left-turns from US-60/Grand Avenue would be restricted where possible. Roadway efficiency would be further enhanced with the use of the MUDs and USCs as necessary at key intersections. This concept requires BNSF Railway coordination for operation. Additional funds would be required, as well as transit O&M funding.

4.4. Green Concept – Other High Capacity Transit

The Green Concept was developed based upon the national case study review of similar corridors performed as part of Technical Memorandum 3. The concept includes substantial roadway improvements along US-60/Grand Avenue; however, HCT in exclusive right-of-way is provided to maximize transit speed and minimize conflicts. HCT technologies, other than commuter rail (Blue Concept), may include BRT or LRT. The premise of the concept is to minimize the roadway footprint through narrowed, and sometimes fewer lanes, and shift travel from being auto-centric to a true multimodal corridor. The Green Concept is illustrated in ***Figure 13*** and the proposed improvements are summarized below. A map book was generated to illustrate the concept in greater detail and is presented in ***Appendix TM5-3***.

Figure 13 – Green Concept – Other HCT



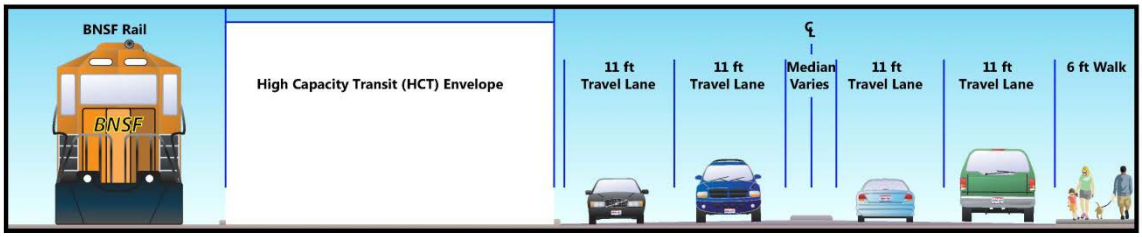
Roadway Characteristics

The Green Concept generalized corridor typical sections are illustrated below in ***Figure 14*** and ***Figure 15***. Depending on more detailed investigation, it may include two or three lanes for each direction of travel and a typical urban raised median.

Figure 14 – Green Concept 6-Lane Typical Section

Graphic for illustrative purposes only - not to scale.

Figure 15 – Green Concept 4-Lane Typical Section



Graphic for illustrative purposes only - not to scale.

Several new, or substantially improved, grade separated TIs were identified in the study area, including:

- Bell Road;
- Greenway Boulevard;
- 91st Avenue;
- 75th Avenue/Olive Avenue;
- 67th Avenue/Northern Avenue;
- 51st Avenue/Bethany Home Road;
- 35th Avenue/Indian School Road; and
- McDowell Road/19th Avenue.

Transit Characteristics

Unlike the previous corridor concepts, the Green Concept illustrated in ***Figure 14*** and ***Figure 15*** above provides an envelope between the BNSF Railway and roadway for HCT to operate, limiting access conflicts with crossroads and adjacent parcels. A more robust transit feeder system would be necessary to support the US-60/Grand Avenue HCT service line. The corridor concept requires partner agency coordination.

Stop spacing with BRT and LRT may be more frequent than commuter rail. Within the study area, candidate HCT stops are located at:

- *Meeker Boulevard* – North Surprise;
- *Bell Road* – Surprise;
- *Santa Fe Lane* – El Mirage;
- *103rd Avenue* – Sun City;
- *83rd Avenue* – Peoria;
- *59th Avenue* – Glendale;
- *43rd Avenue* – Glendale/Phoenix;
- *27th Avenue* – Phoenix; and
- *19th Avenue* – Phoenix.

An assessment for the potential of HCT technologies other than commuter rail is presented ***Appendices TM5-4, TM5-5, and TM5-6***. Key findings derived from the data in these appendices are presented below.

HCT Preliminary Analysis (Appendix TM5-4) – A preliminary analysis identified the concentrations of population and employment between Meeker Boulevard and 7th Avenue, a length of approximately 23 miles. Analysis of the corridor was conducted utilizing data at the zip code level, which included the MAG Employment Database, zip code business patterns, and the U.S. Census, America Community Survey. The statistics that were evaluated included population, housing units, employment and number of establishments. Based on this research, nine areas along the US-60/Grand Avenue corridor were identified which have a mix of characteristics that are important to HCT, including density of population and housing, concentration of employment and the presence of large employers within proximity to the corridor. These nine areas became the candidate stop locations of the Green Concept listed above.

HCT Analysis (Appendix TM5-5) – The study area was subjected to the Step 1 analysis of the MAG *Sustainable Transportation and Land Use Integration Study* (ST-LUIS) (March 2013) evaluation process, which is a high-level screening of eight weighted criteria to identify transit stop characteristics that have the potential to support HCT. The analysis used for this project assessed the nine candidate stop locations using Step 1, with an evaluation of six of the eight criteria, including:

- Total Population;
- Percent of Minority Population;
- Percent Low Income Households (under $20,000/Year);
- Total Employment;
- Transit-Supportive Density (Jobs + Residents/ Gross Acre); and
- Transit-Supportive Job Density (Jobs/ Gross Acre).

Transit stops that met or exceeded a 60 percent threshold were carried forward to Step 2 for further screening. Four out of nine potential stops met or exceeded this 60 percent threshold, due primarily to the high percentage of low income and minority population, transit supported density, and households without a vehicle. These stops include Thompson Ranch Road, 59th Avenue, 43rd Avenue, and 27th Avenue. 83rd Avenue fell just below the threshold. All of these stops and are suburban in nature with less than 15 persons per acre; which is shy of high capacity oriented density of 45+ persons per acre.

Based on the methodology utilized in this analysis, the US-60/Grand Avenue corridor currently does not meet the minimum criteria to support HCT. High concentrations of people and employment within proximity to the stop are needed to generate passenger volumes and maximize the benefit of public investment in HCT.

HCT Ridership (Appendix TM5-6) – Potential HCT ridership for the Green Concept was modeled by MAG to provide a preliminary look at assessing travel demand. Modeling results are based on the 2035 model, assuming 12 minute headways for all routes and the route along US-60/Grand Avenue was not interlined. MAG's model results indicated the existing LRT starter line to be approximately 31,000 average daily boardings for 2035. As a basis of comparison, per the Valley Metro Ridership Report the starter line 2014 ridership is approximately 44,000 average weekday boardings, with Saturday and Sunday averages of approximately

35,000 and 24,000, respectively. The MAG model indicated the US-60/Grand Avenue route would service approximately 6,000 average daily boardings. This projection is less than one-fifth the projection for the starter line, as well as the anticipated boardings for the Tatum to West Phoenix and Glendale to Mountain View routes (approximately 31,000 and 20,000, respectively). While interlining is expected to modestly increase ridership along the US-60/Grand Avenue route based on input from MAG, it is not anticipated to experience the same level of boardings as other routes.

Planning Level Cost Estimate

The planning level cost estimate of the Green Concept is $2,759 million, of which roadway capital costs are estimated at $523 million. HCT costs were based on LRT, given the regional interest in this transit technology. Capital costs of approximately $2,236 million and O&M costs of $36 million annually for the HCT system would be required.

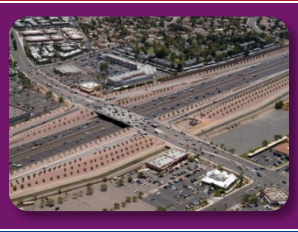
General Considerations

The Green Concept improves regional mobility with a complete-streets facility. Data provided by MAG indicated that the corridor could average approximately 92,000 daily person trips. This corridor concept would change the character along the corridor, facilitating redevelopment opportunities and supporting land use change relatively consistent with general plans. Access to properties along US-60/Grand Avenue would be limited to mostly right-in right-out access. Left-turns from US-60/Grand Avenue would be restricted where possible. Expansion and capacity of the roadway portion of US-60/Grand Avenue corridor would be limited to encourage a mode shift to HCT. Roadway efficiency would be enhanced with the use of the MUDs and USCs as necessary at key intersections. In addition to roadway improvements, the Green Concept requires a transit feeder system that presently does not exist. The concept requires corridor partner agency coordination, including general plan updates to promote alternative travel modes. This corridor concept would require the greatest funding outlay, which would mirror the investment in the region's LRT starter line. HCT ridership, however, would be approximately one-fifth of the region's LRT starter line.

4.5. Concept Summary

A summary of key points associated with each corridor concept is provided in ***Table 1***.

Table 1 – Concept Summary

Concept	Potential Capital	Notes
Continue RTP Improvements (No Action) 72,000 avg person trips*	$63m (funded) $97m (Phase V, after Prop 400) $160m (Total)	▪ Programmed amounts; could be higher depending upon final geometries. ▪ Continues with current Regional Transportation Plan actions for the corridor.
 **US-60/Grand Avenue Expressway** 96,000 avg person trips*	$1,550m (Without R/W) $1,550m (Total)	▪ Right-of-way acquisition could exceed $1,250m. ▪ Transit/Bus Rapid Transit could be provided with this option (costs to be determined).
Commuter Rail with Operational Improvements 77,000 avg person trips*	$403m (Roadway, without R/W) $434m (Transit, Phase A capital) $837m (Total)	▪ Phase A O&M - $7.4m annually. ▪ Phase B – Enhanced with Reverse Commutes: $600m capital; $10.8m O&M annually. ▪ Phase C – All Day Directional: $701m capital; $50m O&M annually.
Other High Capacity Transit 92,000 avg person trips*	$523m (Roadway, without R/W) $2,236m (HCT Transit capital) $2,759m (Total)	▪ Current O&M costs on the 20-mile starter system - $36m (est.) annually.

*Person trips estimated and provided by MAG.

5.0 Stakeholder Input

The study team received input on the four corridor concepts from the Charter, Management, and Planning Partners; public; and other stakeholders. Input was received through committee meetings as well as one-on-one discussions. The study team also hosted topical focus groups with business and freight interests as well as two public open houses to solicit input on the corridor concepts. Much of the input received emphasized US-60/Grand Avenue's important role in supporting economic development and multimodal transportation, particularly related to the potential for redevelopment throughout the corridor. Stakeholders and the public noted that US-60/Grand Avenue is a regional mobility asset; while corridor improvements should foster economic development along the corridor, solutions must respect the unique history and character of each community the corridor traverses.

5.1. Red Concept – Continue RTP Improvements

Participants of the rail and freight interest focus group were quick to point out that the Red Concept alone would neither support redevelopment efforts nor would it assist in effecting change through the corridor. Specifically, participants of the focus group noted the Red Concept would not support transit-oriented development and the types of economic investment West Valley communities have been focused on generating. While there was support for continuing with programmed improvements, input received from stakeholders and the public indicated those programmed improvements alone did not fulfill the long-term vision for this corridor.

5.2. Purple Concept – US-60/Grand Avenue Expressway

This corridor concept was favorable to those that desired free-flow movement of traffic between key activity centers or community nodes. However, as was noted by participants of the rail and freight interest focus group and public open houses, if only spot operational improvements are made, the modest efficiency gains would not justify the considerable investment needed to implement them. Further, participants of the rail and freight interest focus group speculated that this corridor concept would not spur the change in existing development patterns the adjacent communities desire.

Input received from stakeholders and the public emphasized the desire for an integrated corridor that was able to connect downtown centers while ensuring pedestrian access and mobility. With the public and stakeholders increased interest in multimodal solutions, this corridor concept seemed too roadway-focused and not in line with the long-term vision of the region. Input received also noted that a high-capacity expressway corridor concept would not best support local economic development efforts, as is a focus amongst the West Valley communities connected by US-60/Grand Avenue.

5.3. Blue Concept – Commuter Rail with Operational Improvements

Input regarding the Blue Concept was largely positive. The commuter rail component, in particular, aligned the best with many municipal plans (e.g. Surprise, El Mirage, and Peoria) and would offer the best project/concept "phasing" opportunities. However, input from stakeholders and the public acknowledged that in order for this concept to be successful, a robust localized transit system would need to be in place to support it. Some input received questioned whether commuter rail along this corridor was viable. Many were pleasantly surprised at the relative cost competitiveness of the Blue Concept.

5.4. Green Concept – Other High Capacity Transit

Participants of the business and economic development focus group thought this corridor concept would connect activity centers most effectively, but questioned whether the concept would jeopardize other regional assets, such as valuable industrial and freight opportunities that, in some cases, only exist along this specific corridor. They contended that the concept could be further strengthened with a network of transit features coupled with other strategies, such as dedicated commuter lanes or road diet measures. Input also suggested that this concept may not compliment a phased approach for employing multimodal options, and would not be as flexible or adaptable over time.

6.0 Evaluation Criteria and Concept Screening

6.1. Evaluation Criteria

Evaluation criteria were developed to assess the corridor concepts in order to identify a preferred approach to improvements along US-60/Grand Avenue. The evaluation criteria are the following:

- Travel Demand – how well an alternative accommodates future travel.
- Safety and Accessibility – how well an alternative minimizes conflict points and enhances adjacent property access.
- Economic Opportunity – how well an alternative provides redevelopment opportunities.
- Investment Needs – how much revenue is required for implementation.
- Corridor Vision – whether the alternative meets the planning goals espoused by the corridor communities.

6.2. Concept Screening

The analysis of the Red, Purple, Blue, and Green Concepts is summarized in ***Figure 16***. A qualitative rating was assigned to each criterion as follows:

- Advantage
- Neutral
- Disadvantage

The ratings were used to identify a recommended concept. The evaluation criteria are not weighted.

Figure 16 – Concept Screening

Concept Screening

	Red	Purple	Blue	Green
Travel Demand • Accommodate future travel?	○	●	●	●
Safety and Accessibility • Minimizes conflict points and enhances adjacent property access?	◑	◑	●	●
Economic Opportunity • Provide redevelopment opportunities?	○	○	◑	●
Investment Needs • Does the concept require a significant revenues for implementation?	●	○	◑	○
Corridor Vision • Meet the planning goals espoused by the corridor communities?	◑	○	●	○

Legend ● Advantage ◑ Neutral ○ Disadvantage

7.0 Conclusion

Based upon the corridor concept evaluation presented above, the Blue Concept should advance. This recommendation was presented to the Charter Partners, Management Partners, Planning Partners, and general public through the first half of 2014 and was generally well received. Key considerations that led to the selection of the Blue Concept are that it:

- Aligns with general plans;
- Integrates multimodal travel;
- Improves vehicular operations and person throughput;
- Provides opportunities for economic redevelopment;
- Enhances safety and will facilitate access management; and
- Has the lowest planning level cost estimate, except for the Red Concept (no-action).

The Red Concept will also advance. Even though it completes current committed roadway projects, it serves as the no-build option.

APPENDIX TM5-1

References

US-60/Grand Avenue COMPASS
Past Studies Summary Table

ID	Document				Source	
	Title	Description	Author	Dated	Provider	Collected By
B-002	Phoenix West High Capacity Transit Study		Valley Metro	Jul-11	B&N	JB
B-003	El Mirage Road - Northern to Bell Road	DCR, Plans, Environmental	MCDOT / Baker / Wilson / AMEC	Dec-09	B&N	JB
B-004	Grand Avenue Feasility Study - Loop 202 to Loop 101		ADOT	2008	B&N	JB
B-005	2007 MAG Regional Travel Time & Travel Speed Study		MAG / Jacobs	Apr-08	B&N	JB
B-006	2010 City of Peoria Access Management Guidelines		City of Peoria	2010	B&N	JB
B-007	MAG Access Management Primer		MAG / B&N		B&N	JB
B-008	Access Management Primer & Concepts		MAG & B&N	Nov-11	B&N	JB
B-009	2011 City of Peoria Access Management Guidelines (Also See B-006)		City of Peoria	2011	B&N	JB
B-010	2011 Sustainable Transportation and Land Use Integration Study		MAG	Jul-05	B&N	JB
B-011	Commuter Rail System Study	Regional Commuter Rail System	MAG	May-10	B&N	JP
B-012	Grand Avenue Commuter Rail Corridor Development Plan	US-60/Grand Avenue Commuter Rail	MAG	May-10	B&N	JB
B-013	Grand Avenue MIS - Phase II Final Report	02/06 Recommended Improvements	MAG/HDR	Feb-13	B&N	JB
B-015	NCHRP Synthesis 271 - Traffic Signal Operations Near Highway Rail Grade Crossings		TRB	1999	B&N	
B-016	Grand Avenue (US 60) Traffic Signal Coordination Timing		Kimley-Horn	Mar-13	B&N	JB
B-018	35th Avenue/Indian School/Grand Avenue At-Grade Railroad Crossing Safety and Improvement Analysis		Lee Engineering	Nov-08	B&N	JB
B-019	27th Avenue/Thomas Road/Grand Avenue At-Grade Railroad Crossing Safety and Improvement Analysis		Lee Engineering	Nov-08	B&N	JB
B-020	Grand Freeway Concept Finalization Report	Grand Avenue Freeway	ADOT/Tudor Engineering	Sep-89	B&N	JP
B-021	West Area Transportation Analysis	West Valley Transportation Study	MAG/PBQ&D	Jun-85	B&N	JP
B-022	Grand Avenue Termination Study	Grand Avenue Eastern Terminus	MAG/Tudor Engineering	May-89	B&N	JP
B-023	MAG Freeway/Expressway Plan		MAG	Oct-87	B&N	JP
B-024	Grand Avenue Corridor Study		ADOT	1986	B&N	JP
B-025	Traffic Analysis Report for the Freeway Alternative	Grand Avenue, New River to 7th Ave and Van Buren	ADOT/Tudor Engineering	Jul-89	B&N	JP
B-026	Camelback TI Traffic Analysis Report	Grand Avenue, New River to 7th Ave and Van Buren	ADOT/Tudor Engineering	Sep-88	B&N	JP
W-001	US-60/Grand Ave Access Mgmt Plan SR-303L/Estrella Frwy to SR-74	Access Management Plan	MAG	Jan-10	Wilson	DM
W-002	Reducing Congestion in Lee County, Florida	Queue Jumpers	Reason Policy Study 374 - C. Swenson & R. Poole	Feb-09	Wilson	JT
W-003	Widening of Grand Avenue to a Continuous Six-Lane Arterial Street	Final DCR - SR 303L to 99th Ave	ADOT / DMJM Harris / AECOM	Jan-07	Wilson	JT
W-004	Grand Avenue Major Investment Study - Phase II	SR 101L to McDowell Road	MAG	Feb-06	Wilson	JT
W-005	Grand Avenue Corridor Study	Beardsley Canal to 7th Avenue/Van Buren	MAG	May-98	Wilson	JT
W-006	Grand Avenue Limited Expressway Design Concept Study for the Glendale Area		Glendale / URS	Dec-03	Wilson	JT
W-007	Grand Avenue Major investment Study (MIS) Environmental Overview		ADOT / Logan Simpson	Sep-99	Wilson	JT
W-008	The Grand Vision - Grand Avenue Image Improvement Study		Glendale / Todd & Associates	May-01	Wilson	JT
W-009	US 60, Grand Avenue - 43rd Avenue to McDowell Road	Final DCR	ADOT / DMJM Harris / AECOM	Oct-08	Wilson	JT
W-010	US 60, Grand Avenue - 71st Avenue to 43rd Avenue	Final DCR	ADOT / DMJM Harris / AECOM	Oct-08	Wilson	JT
W-011	US 60 Grand Avenue - 99th Avenue to 83rd Avenue	Final PA	ADOT / Stanley Consultants	Sep-05	Wilson	JT
W-012	US 60, Grand Avenue - SR 101L to 71st Avenue (Peoria Segment)	Utility Report Statge V (100%) Design	ADOT / Kimley-Horn	Nov-11	Wilson	JT
W-013	US 60, Grand Avenue - SR 101L to 71st Avenue	Final DCR	ADOT / DMJM Harris / AECOM	Dec-08	Wilson	JT
W-014	US 60 - Grand Avenue: SR 101L to McDowell Road	Final Drainage Report	ADOT / Kimley-Horn	Aug-11	Wilson	JT
W-015	US 60, Grand Avenue - SR 101L to McDowell Road	Utility Report State III (60%) Design	ADOT / Kimley-Horn	Sep-09	Wilson	JT
W-016	US 60, Grand Avenue - SR 303 to 99th Avenue, Segment 1	Final Drainage Report	ADOT / Dibble Engineering	Nov-08	Wilson	JT
W-017	US 60, Grand Avenue - SR 303L to SR 101L	Revised - Draft US 60 Imp. Feasibility Rpt.	ADOT / DMJM Harris / AECOM	Nov-08	Wilson	JT
W-018	NCHRP State of the Practice in Highway Access Management		Transportation Research Board	2010	Wilson	JT
W-019	ADOT Highways Program, 2013-2017	5-Yr Transportation Facilities Const. Program	ADOT	Jun-12	Wilson	LS
W-020	MAG Regional Transit Framework, Final Report and Executive Summary	Prioritzed transit needs through 2030	MAG/Valley Metro/BQAZ	Oct-09	Wilson	LS
W-021	Northern Parkway DCR, Dft Chapter 1	Design Concept Report for Northern Pkwy	Glendale/URS	Jan-08	Wilson	LS
W-022	El Mirage Road, Northern Avenue to Bell Road, Final Report	Corridor Improvement Study	MCDOT/Kirkham Michael	Feb-07	Wilson	LS
W-023	El Mirage Road Improvements, Northern Ave to Grand Ave	Project Activities Review_FY11-Fy15	MCDOT	Nov-12	Wilson	LS
W-024	El Mirage Road, Grand Avenue Linkage at Thunderbird Road	Project Listings FY 2012-2016	MCDOT	Jun-12	Wilson	LS
W-025	US 60 (Grand Avenue)	Fact Sheet, May 2010	ADOT	May-10	Wilson	LS
W-026	Comprehensive Arterial Bus Rapid Transit Planning Study, Final Report	Final Recommendations, BRT Planning	Valley Metro/RPTA & Parsons Brinckerhoff	Sep-09	Wilson	LS
W-027	Regional Paratransit Study, Final Report	Comprehensive Study of Paratransit Services	Valley Metro/RPTA & TranSystems Corp, et al	Jun-08	Wilson	LS
W-028	Short Range Transit Plan, FY 2012-2016	Identifies Transit Svc and Capital Needs for 5 Yrs	Valley Metro/RPTA	May-12	Wilson	LS

US-60/Grand Avenue COMPASS
Past Studies Summary Table

ID	Document				Source	
	Title	Description	Author	Dated	Provider	Collected By
W-029	US 60 (Grand Avenue) Frontage Road	Maintenance Alert: Through May 2011	ADOT	May-11	Wilson	LS
W-030	Grand Manor Condominiums, SE Corner of 88th Drive & Grand Avenue	Planned Area Development Approval	SKS Grand Manor, LLC, et al	Aug-09	Wilson	LS
W-031	Greeening Lower Grand Avenue, Phoenix, Arizona	Greening Amreica's Capitals	US Environmental Protection Agency	2012	Wilson	LS
W-032	Transportation Improvement Program, FY 2012-20176	5-Yrs of Capital Improvements to Cnty Rdwys	MCDOT	2012	Wilson	LS
W-033	Old Town Peoria Revitalization Plan	Revitalization Strategy for Peoria'a Old Town	City of Peoria	No Date	Wilson	LS
W-034	Park-and-Ride Reprioritization Plan, Final Report	Alignment of P&R Projects with RTP	Valley Metro/RPTA & Parsons Brinckerhoff	Apr-08	Wilson	LS
W-035	Peoria Avenue FY 2012-2021 Capital Improvement Program	83rd Avenue & BNSF Railroad Crossing Removal	City of Peoria	No Date	Wilson	LS
W-036	Peoria Avenue FY 2012-2021 Capital Improvement Program	Grand Avenue Landscaping: L101 to Peoria Av	City of Peoria	No Date	Wilson	LS
W-037	Peoria Multi-modal Transportation Plan, Final Report	Development of a Balanced Transportation Sys	City of Peoria & Nelson\Nygaard, et al	Mar-11	Wilson	LS
W-038	Old Town Specific Area Plan, 2011	Vision for Redvelopment & Revitalization	City of Peoria	2011	Wilson	LS
W-039	General Plan Circulaton Element	Discusses Alternatives to SOV travel	City of Phoenix	Aug-10	Wilson	LS
W-040	General Plan Circulaton Element Appendix	Background Information for Circulaton Element	City of Phoenix	Aug-10	Wilson	LS
W-041	US 60-Grand Avenue_SR 101L to McDowell, Glendale Segment Maps, 061108	ADOT Fact Sheet: DCR & Environmental Study	ADOT	Jun-08	Wilson	LS
W-042	US 60-Grand Avenue_SR 101L to McDowell, Glendale Segment Projects, 061108	ADOT Fact Sheet: DCR & Environmental Study	ADOT	Jun-08	Wilson	LS
W-043	US 60-Grand Avenue_SR 101L to McDowell, Peoria Segment Projects, 061108	ADOT Fact Sheet: DCR & Environmental Study	ADOT	Jun-08	Wilson	LS
W-044	US 60-Grand Avenue_SR 101L to McDowell, Peoria Segment Projects, 061108	ADOT Fact Sheet: DCR & Environmental Study	ADOT	Jun-08	Wilson	LS
W-045	US 60-Grand Avenue_SR 101L to McDowell, Phoenix Segment Projects, 061108	ADOT Fact Sheet: DCR & Environmental Study	ADOT	Jun-08	Wilson	LS
W-046	US 60-Grand Avenue_SR 101L to McDowell, Phoenix Segment Projects, 061108	ADOT Fact Sheet: DCR & Environmental Study	ADOT	Jun-08	Wilson	LS
W-047	Transportation Needs Study, Phase I and II, Drawings and Cost, Final Report	Preliminary Engineering & Costs for City TIP	City of Peoria/URS	Apr-05	Wilson	LS
W-048	US 60 Corridor Bus Service	Valley Metro System Map	Valley Metro	Jul-12	Wilson	LS
W-049	US 60-Downtown Phoenix Service Links	Valley Metro System Map	Valley Metro	Jul-12	Wilson	LS
W-050	US 60/Grand Avenue Planned Improvements	Projects: Phoenix Metro Area	ADOT Projects Web Site, Vly Fwys, US60/Grand Ave	Oct-12	Wilson	LS
W-051	Youngtown General Plan	Guidance for Future Land Use & Development	Town of Youngtown/HDR Engineering, Inc.	2003	Wilson	LS
P-001	Are We There Yet? The Role of Transp. In Driving AZ's Global Economy		Arizona Forward	Oct-12	PSA	PF
P-002	Land Use and Traffic Congestion	Final Report 618	ADOT Research Center	Mar-12	PSA	PF
P-003	High-Capacity Transit Study	Final Report	MAG/IBI Group	Jun-03	PSA	PF
P-004	El Mirage General Plan	General Plan	City of El Mirage/The Planning Center, et al	Dec-09	PSA	PF
P-005	Glendale 2025: The Next Step	General Plan	City of Glendale/Community Sciences Corporation, et al	May-02	PSA	PF
P-006	Glendale City Center Master Plan	Specific Area Plan	City of Glendale/RNL Design, et al	Jul-02	PSA	PF
P-007	The Grand Vision	Grand Ave Image Improvement Study	City of Glendale/Todd & Associates	May-01	PSA	PF
P-008	Old Town Specific Area Plan	Peoria Old Town Plan	City of Peoria	2011	PSA	PF
P-009	Peoria General Plan	General Plan	City of Peoria/BRW (2000 version)	2011	PSA	PF
P-010	Economic Development Implementation Strategy	Peoria ED plan	City of Peoria/ Garnet Consulting Services, Inc, et al	Dec-10	PSA	PF
P-011	Greening Lower Grand Avenue	Design plan	EPA/Phoenix/PLAN*et, et al	2012	PSA	PF
P-012	General Plan 2002	Phoenix General Plan	City of Phoenix	2002	PSA	PF
P-013	Surprise Center Village	Village 1 Plan	City of Surprise	Aug-10	PSA	PF
P-014	General Plan 2030: One City, Many Choices	Surprise General Plan (NOT RATIFIED)	City of Surprise	Jul-08	PSA	PF
P-015	General Plan 2020: Imagine the Possibilities	Surprise General Plan	City of Surprise	Dec-05	PSA	PF
P-016	Youngtown General Plan	General Plan	Town of Youngtown/HDR	2003	PSA	PF
P-017	Maricopa County 2020, Eye to the Future	Comprehesnive Plan	Maricopa County/BRW (1997 version)	Aug-02	PSA	PF
P-018	Surprise General Plan 2035: Foundation for the Future	General Plan	City of Surprise	Jun-13	PSA	PF
P-019	Youngtown General Plan 2025	Youngtown General Plan (update; pending ratificatior	Town of Youngtown/Blanton & Cooper	Jun-14	PSA	PF

APPENDIX TM5-2

MAG Regional Transit Framework Study Transit Options Matrix

MAG Regional Transit Framework Study

TRANSIT OPTIONS

	Bus Rapid Transit	Light Rail Transit	Modern Streetcar	Commuter Rail
Operate In Own Travel Lane	●	●	●	●
Able to Share Auto Travel Lanes	●		●	
Flexible Routing	●			
Frequency of Stops:				
1/8 to 1/2 mile	●		●	
1/2 to 2 miles	●	●		
2 to 10 miles	●			●
Typically Operates Throughout Day	●	●	●	
Service Applications:				
Serve Small but Intensely Developed Areas	●		●	
Serve Multiple Regional Destinations	●	●		
Provide Regional Intercity Service	●			●
Travel Speeds:				
High				●
Moderate	●	●	●	
Slower	●		●	
High Capacity Vehicles		●		●
High Economic Development Potential		●	●	

*All modes have valid applications depending on operating environment and passenger demand.

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Valley Metro

METRO

APPENDIX TM5-3

Preliminary Green Concept Map Book

Legend
Potential LRT Station
Light Rail Transit
LRT-ROW
BNSF
Sheets
W Grand Ave
1
2
3
4
5
6
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8
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12
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14
15
16
17
18
19
20
21
22
23
24
25
26
27
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29
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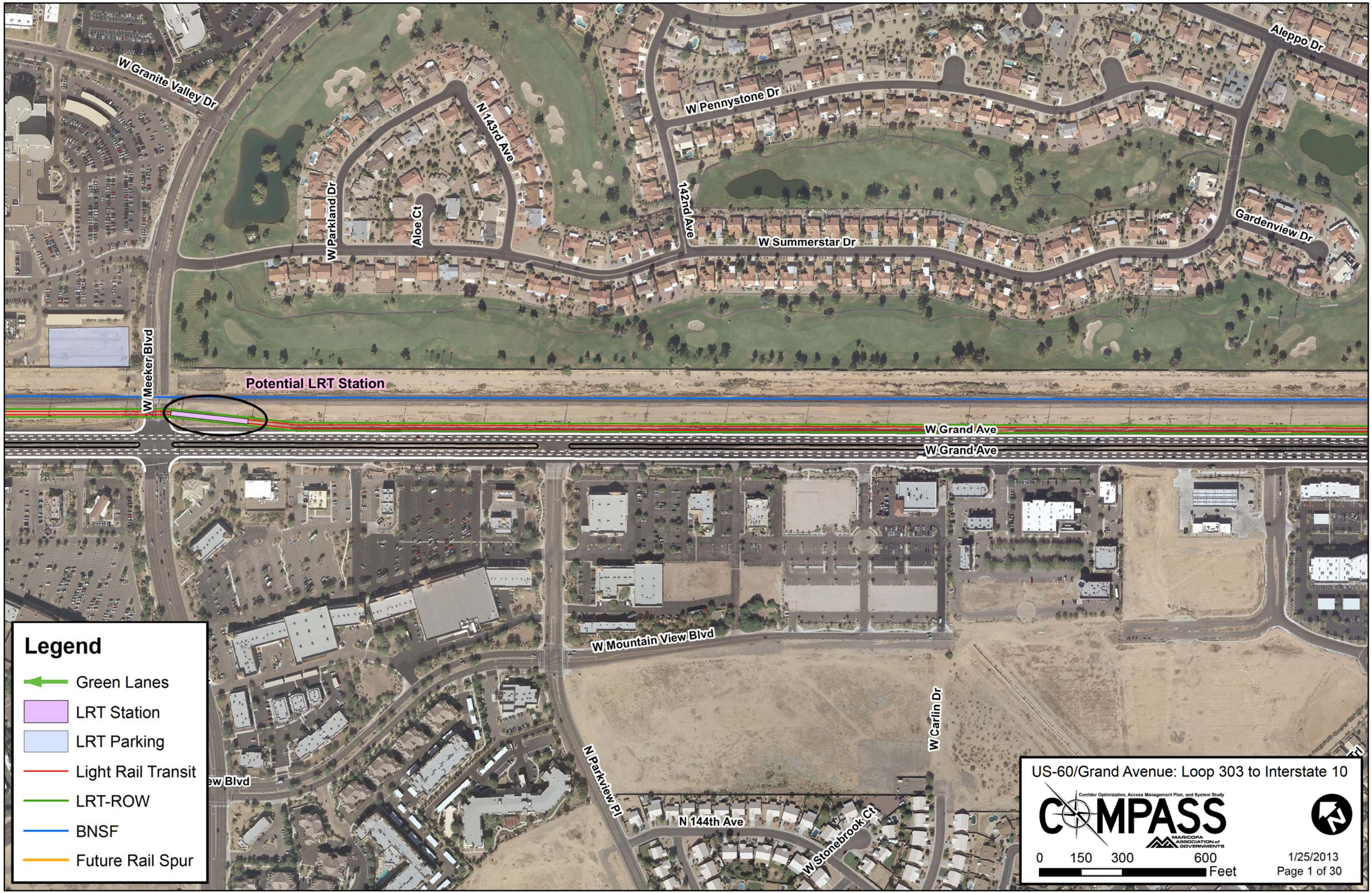
101
17
10
Aqua Fria Fwy
W Union Hills Dr
W Hatfield Rd
W Deer Valley Rd
W Beardsley Rd
W Jomax Rd
Beardsley Csr
W Pinnacle Peak Rd
N 91st Ave
W Acoma Dr
W Thunderbird Rd
N 43rd Ave
N 35th Ave
N Black Canyon Hwy
Arizona Canal
W Glendale Ave
N 19th Ave
E Camelback Rd
W Cactus Rd
W Peoria Ave
N 111th Ave
N 103rd Ave
51st Ave
59th Ave
67th Ave
75th Ave
83rd Ave
91st Ave
S 19th Ave
S 35th Ave
W Bell Rd
W Greenway Rd
W Acoma Dr
W Waddell Rd
N Dysart Rd
W Olive Ave
W Northern Ave
W Glendale Ave
W Bethany Home Rd
W Camelback Rd
W Indian School Rd
W Thomas Rd
W McDowell Rd
W Van Buren St
W Buckeye Rd
W Lower Buckeye Rd
US-60/Grand Avenue: Loop 303 to Interstate 10
Corridor Optimization, Access Management Plan, and System Study
COMPASS
MARICOPA ASSOCIATION of GOVERNMENTS
Sheet Key
1/25/2013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W Parkland Dr
Aloe Ct
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W Pennystone Dr
142nd Ave
Aleppo Dr
W Summerstar Dr
Gardenview Dr
W Meeker Blvd
Potential LRT Station
W Grand Ave
W Grand Ave
W Mountain View Blvd
W Carlin Dr
N Parkview Pl
N 144th Ave
W Stonebrook Ct
Legend
Green Lanes
LRT Station
LRT Parking
Light Rail Transit
LRT-ROW
BNSF
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Aleppo Dr
W Summerstar Dr
N Aleppo Dr
N 136th Ave
W Gardenview Dr
N 136th Way
N Lasso Dr
W Gemstone Dr
136th Dr
N 137th Dr
Gardenview Dr
W Grand Ave
W Grand Ave
N Cornerstone Trl
W Two Guns Trl
W Fieldings Ferry Xing
W Cornerstone Trl
Queen Way
W Sun Village Pkwy
N Sunset Trl
N Litchfield Rd
N White Horse Trl
W Santee Way
W Powderhorn Dr
W Paiute Trl
W Pueblo Trl
N Desert Flower Trl
W Morning Star Trl
W Kiowa Trl
N Inca Way
Legend
Green Lanes
LRT Station
LRT Parking
Light Rail Transit
LRT-ROW
BNSF
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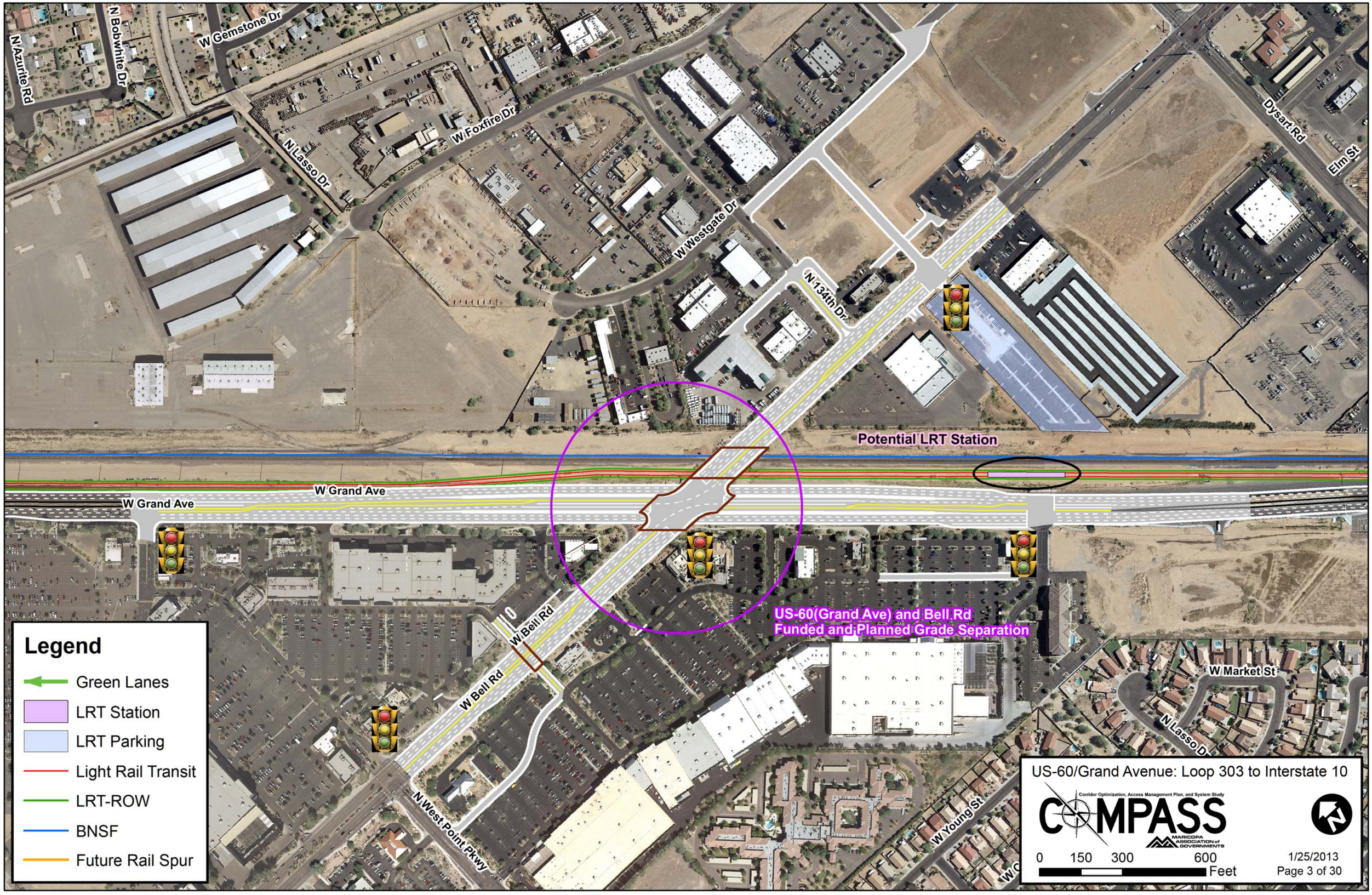
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W Gemstone Dr
W Foxfire Dr
N Lasso Dr
W Westgate Dr
N 134th Dr
Dysart Rd
Elm St
Potential LRT Station
W Grand Ave
W Grand Ave
W Bell Rd
W Bell Rd
US-60(Grand Ave) and Bell Rd
Funded and Planned Grade Separation
W Market St
N Lasso Dr
N West Point Pkwy
W Young St
Legend
Green Lanes
LRT Station
LRT Parking
Light Rail Transit
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BNSF
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Elm St
Dysart Rd
Post Dr
Queen Esther Dr
King Dr
Williams Dr
Cottonwood St
Maryland Ave
W Paradise Ln
N Nash St
W Rimrock St
N Desert Sage Dr
N Sunny Ln
Church St
Santa Fe Dr
W Grand Ave
W Grand Ave
W Grand Ave
Sunny Ln
W Market St
Eva Ln
W Market St
W Market St
W Paradise Ln
W Desert Rock Dr
W Fargo Dr
W Rimrock St
N Dysart Rd
W Central St
N Sunny Ln
W Ironwood St
Gil Balcome St
W Tara Ln
Tara Ln
Legend
Green Lanes
LRT Station
LRT Parking
Light Rail Transit
LRT-ROW
BNSF
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W Thompson Ranch Rd
W Vesta View Dr
N Jerry St
N el Mirage Rd
W Rimrock St
W Ironwood St
N Factory St
N Greasewood St
N Verde St
N Nash St
N Hollyhock St
W Ocotillo St
W Greenway Rd
N Desert Sage Dr
W Blankenship Dr
N Norma Ln
N Factory St
Santa Fe Dr
W Grand Ave
W Grand Ave
W Grand Ave
Grand Ave
Sunny Ln
STOP
Right-In/Right-Out
Grand Ave Frontage Rd Project
City of El Mirage Concept
US-60 (Grand Ave) and Acoma Dr
City of El Mirage Potential US-60
(Grand Ave) Access Point
W Market St
W Carmen Dr
N Fletcher St
W Greenway Rd
Main St
N Sunset Rd
W Sunset Rd
Hopi Rd
Navajo Rd
Canyon Rd
Tonto Rd
Rainbow Rd
N Sunset Rd
N Sunset Rd
N 124th Ave
W Via Camille
N 124th Dr
W St Moritz Ln
N 124th Ln

Legend

- Green Lanes
- LRT Station
- LRT Parking
- Light Rail Transit
- LRT-ROW
- BNSF
- Future Rail Spur
- Eliminated At-Grade Rail Crossing

US-60/Grand Avenue: Loop 303 to Interstate 10

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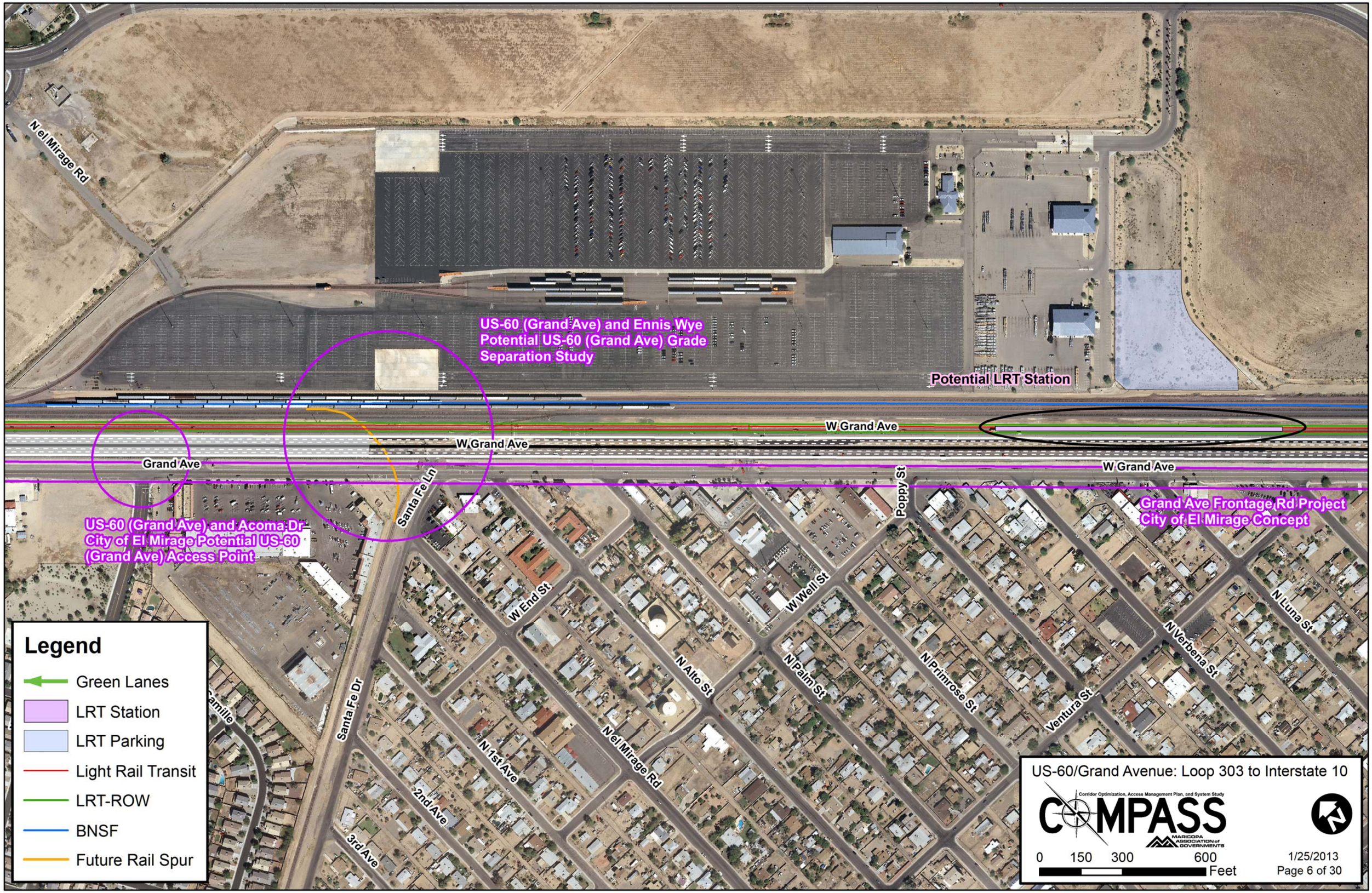
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Separation Study
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Grand Ave
W Grand Ave
Santa Fe Ln
Poppy St
Grand Ave Frontage Rd Project
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US-60 (Grand Ave) and Acoma Dr
City of El Mirage Potential US-60
(Grand Ave) Access Point
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W Well St
N Luna St
N Verbena St
N Alto St
N Palm St
N Primrose St
Ventura St
Santa Fe Dr
N 1st Ave
N el Mirage Rd
2nd Ave
3rd Ave
Legend
Green Lanes
LRT Station
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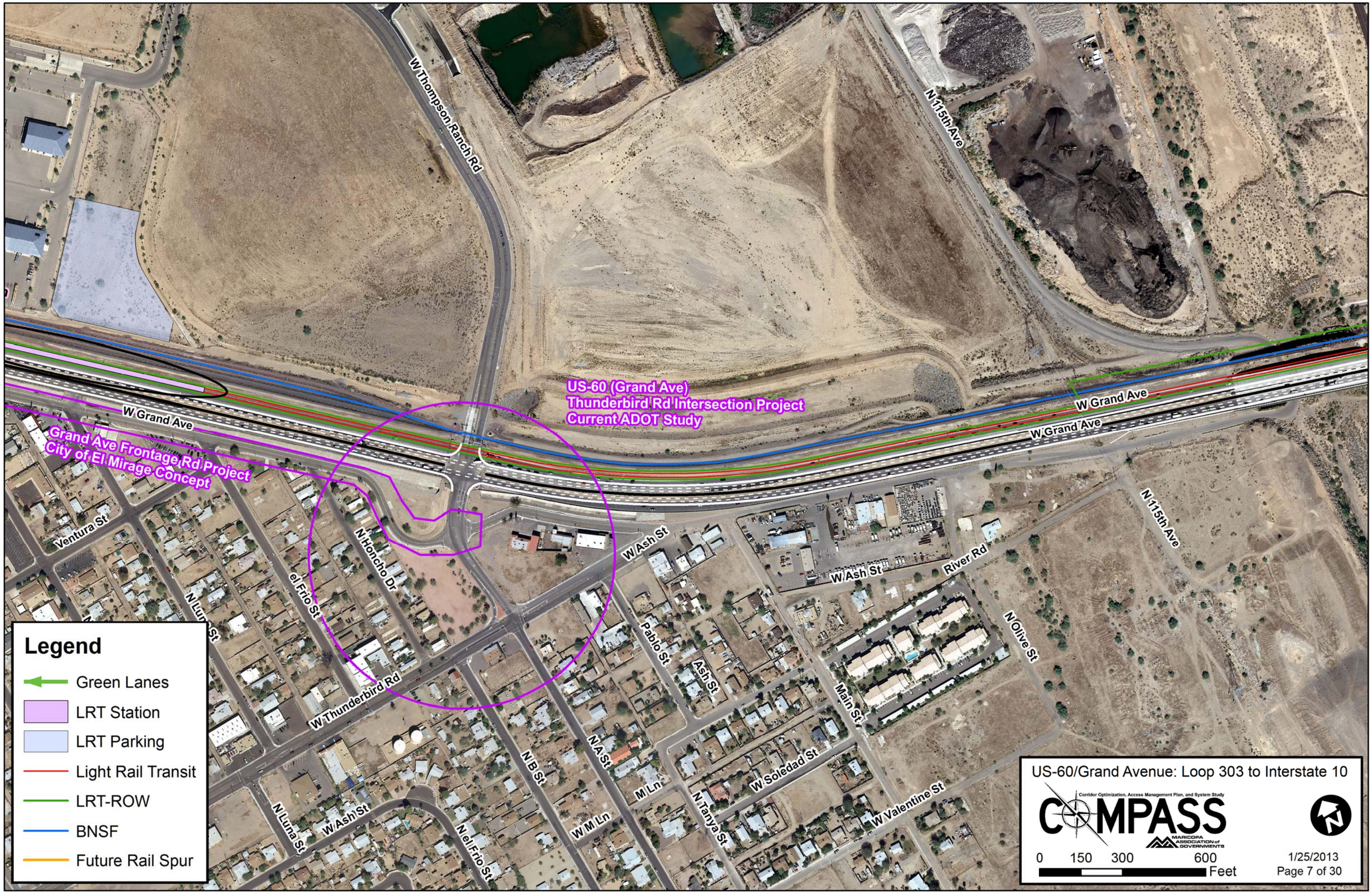
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W Grand Ave
W Grand Ave
Grand Ave Frontage Rd Project
City of El Mirage Concept
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N Luna St
el Frio St
N Honcho Dr
W Ash St
W Ash St
River Rd
N 115th Ave
N Olive St
Pablo St
Ash St
Main St
W Thunderbird Rd
N B St
N A St
M Ln
W M Ln
N Tanya St
W Soledad St
W Valentine St
N Luna St
W Ash St
N el Frio St
Legend
Green Lanes
LRT Station
LRT Parking
Light Rail Transit
LRT-ROW
BNSF
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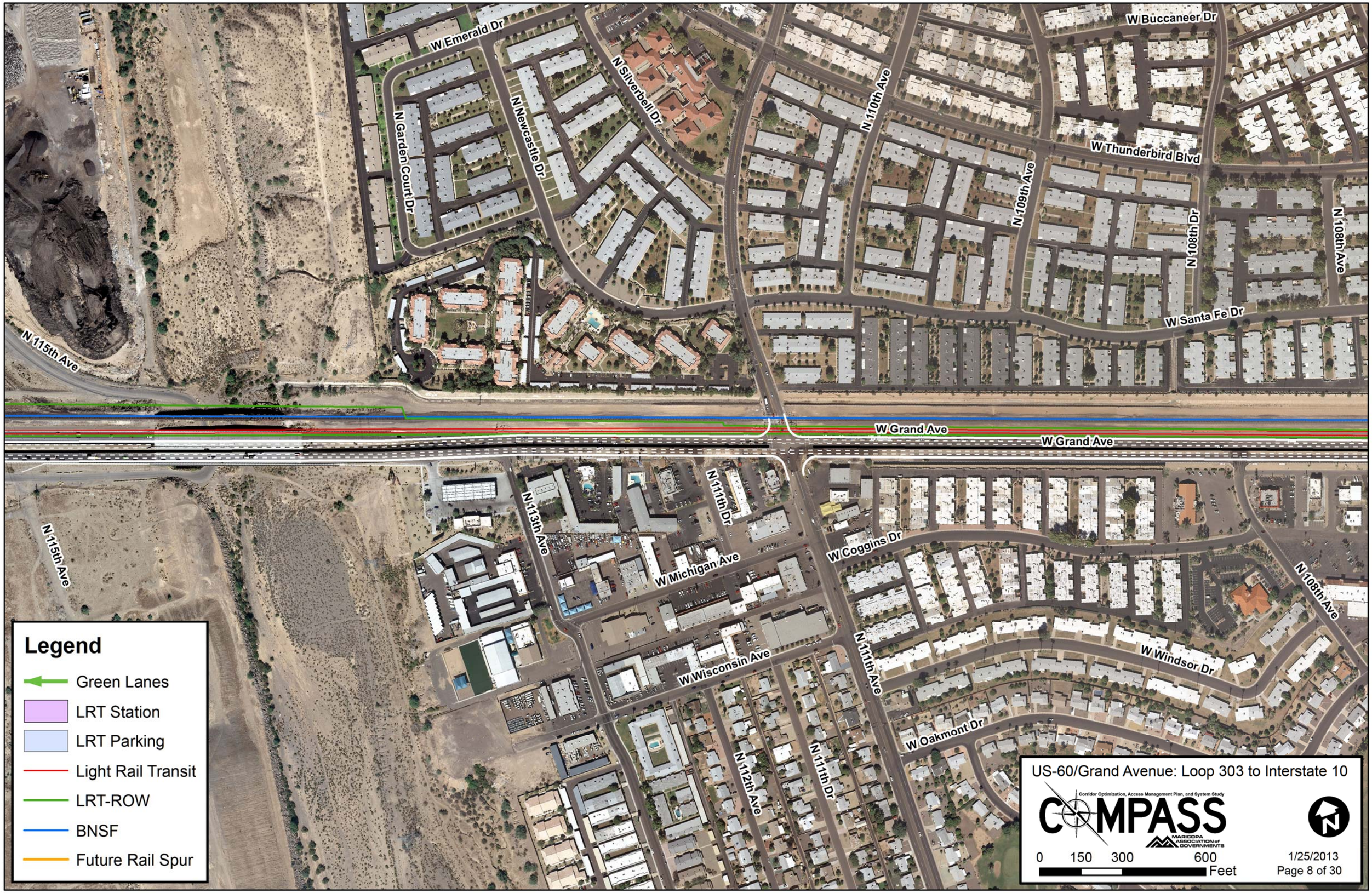
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N 115th Ave
W Grand Ave
W Grand Ave
N 113th Ave
N 111th Dr
W Michigan Ave
W Coggins Dr
N 108th Ave
N 115th Ave
W Wisconsin Ave
N 111th Ave
W Windsor Dr
W Oakmont Dr
N 112th Ave
N 111th Dr
Legend
Green Lanes
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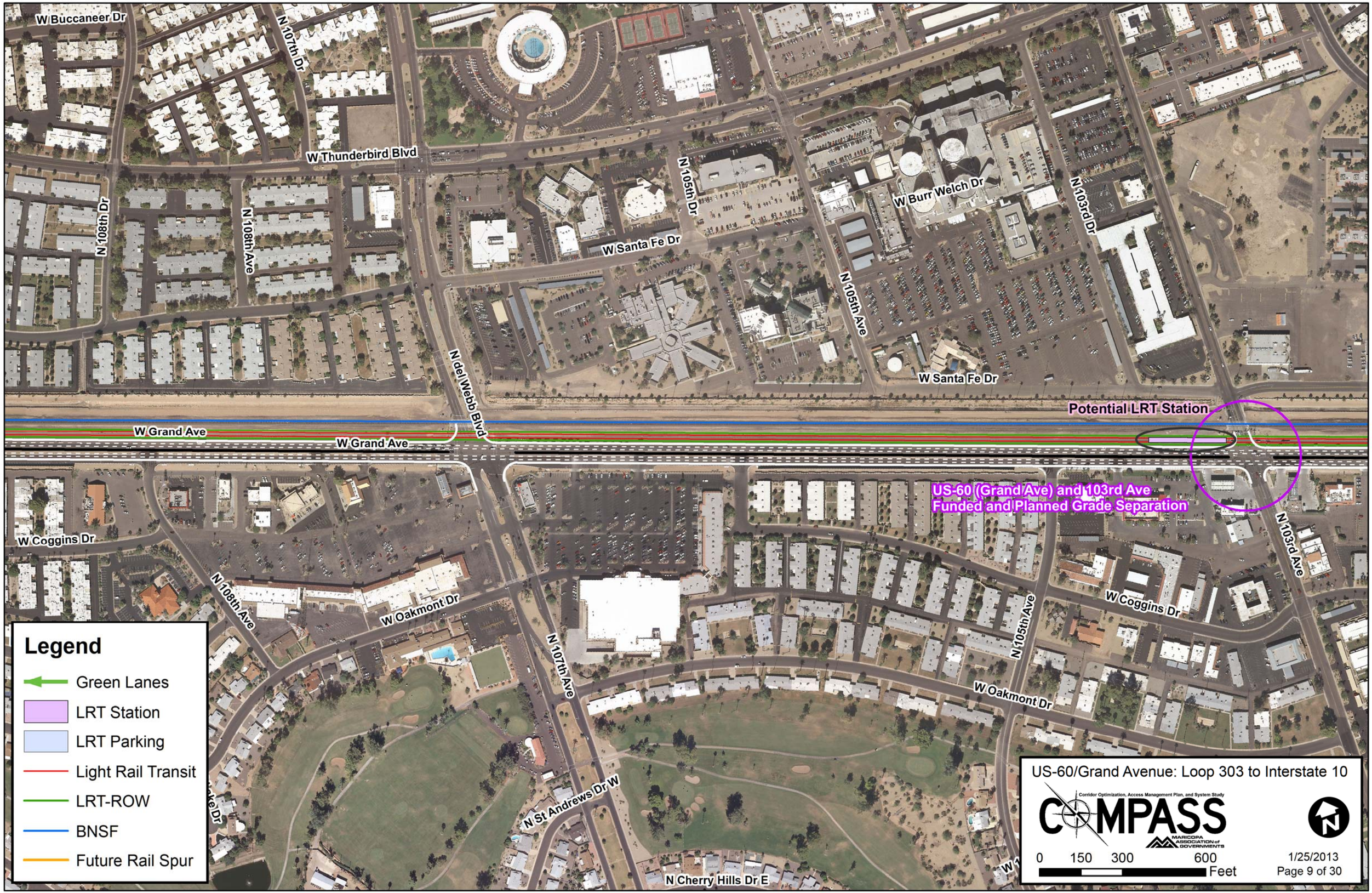
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N 103rd Dr
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N 105th Ave
N del Webb Blvd
W Santa Fe Dr
Potential LRT Station
W Grand Ave
W Grand Ave
US-60 (Grand Ave) and 103rd Ave
Funded and Planned Grade Separation
W Coggins Dr
N 108th Ave
W Oakmont Dr
N 107th Ave
N 105th Ave
W Coggins Dr
N 103rd Ave
W Oakmont Dr
N St Andrews Dr W
N Cherry Hills Dr E
Legend
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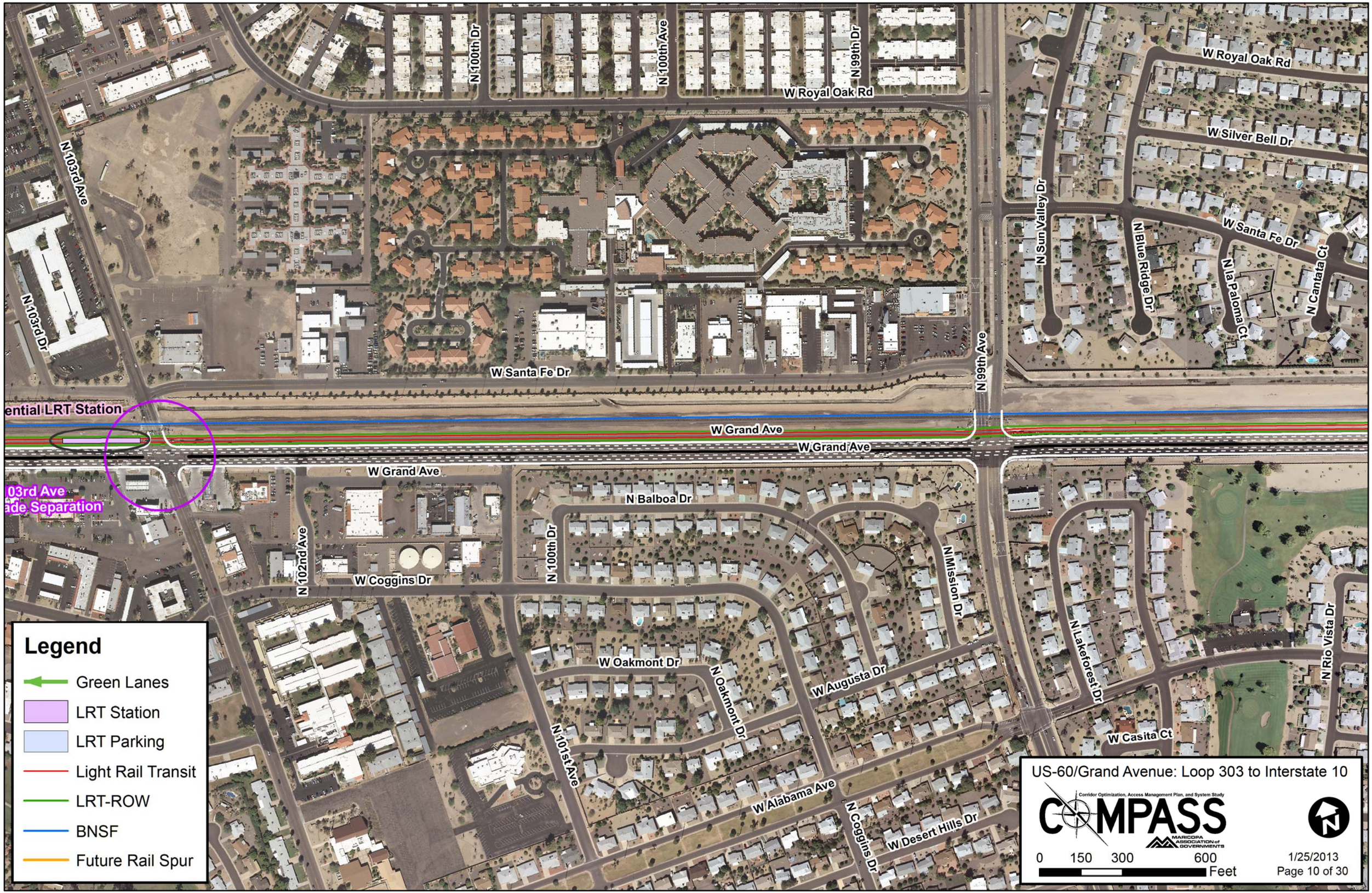
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N 103rd Ave
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W Santa Fe Dr
N la Paloma Ct
N Cantata Ct
W Santa Fe Dr
N 99th Ave
ential LRT Station
W Grand Ave
W Grand Ave
W Grand Ave
03rd Ave
ade Separation
N Balboa Dr
N 102nd Ave
N 100th Dr
W Coggins Dr
N Mission Dr
N Lakeforest Dr
N Rio Vista Dr
W Oakmont Dr
N Oakmont Dr
W Augusta Dr
W Casita Ct
N 101st Ave
W Alabama Ave
N Coggins Dr
W Desert Hills Dr
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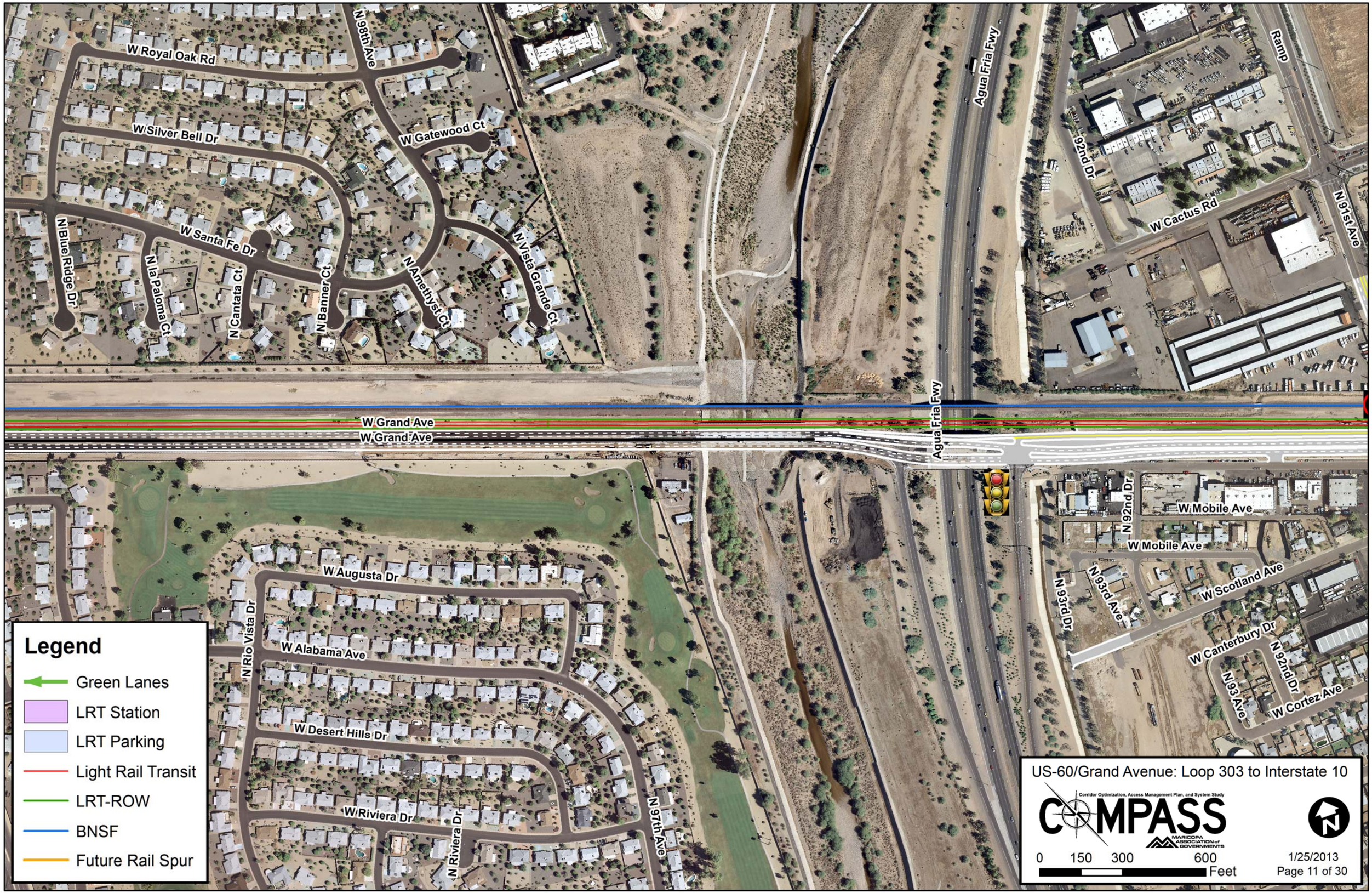
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W Gatewood Ct
W Santa Fe Dr
N Blue Ridge Dr
N la Paloma Ct
N Cantata Ct
N Banner Ct
N Amethyst Ct
N Vista Grande Ct
Agua Fria Fwy
92nd Dr
Ramp
W Cactus Rd
N 91st Ave
W Grand Ave
W Grand Ave
Agua Fria Fwy
N 92nd Dr
W Mobile Ave
W Mobile Ave
N 93rd Dr
N 93rd Ave
W Scotland Ave
W Canterbury Dr
N 92nd Dr
N 93 Ave
W Cortez Ave
W Augusta Dr
N Rio Vista Dr
W Alabama Ave
W Desert Hills Dr
W Riviera Dr
N Riviera Dr
N 97th Ave
Legend
Green Lanes
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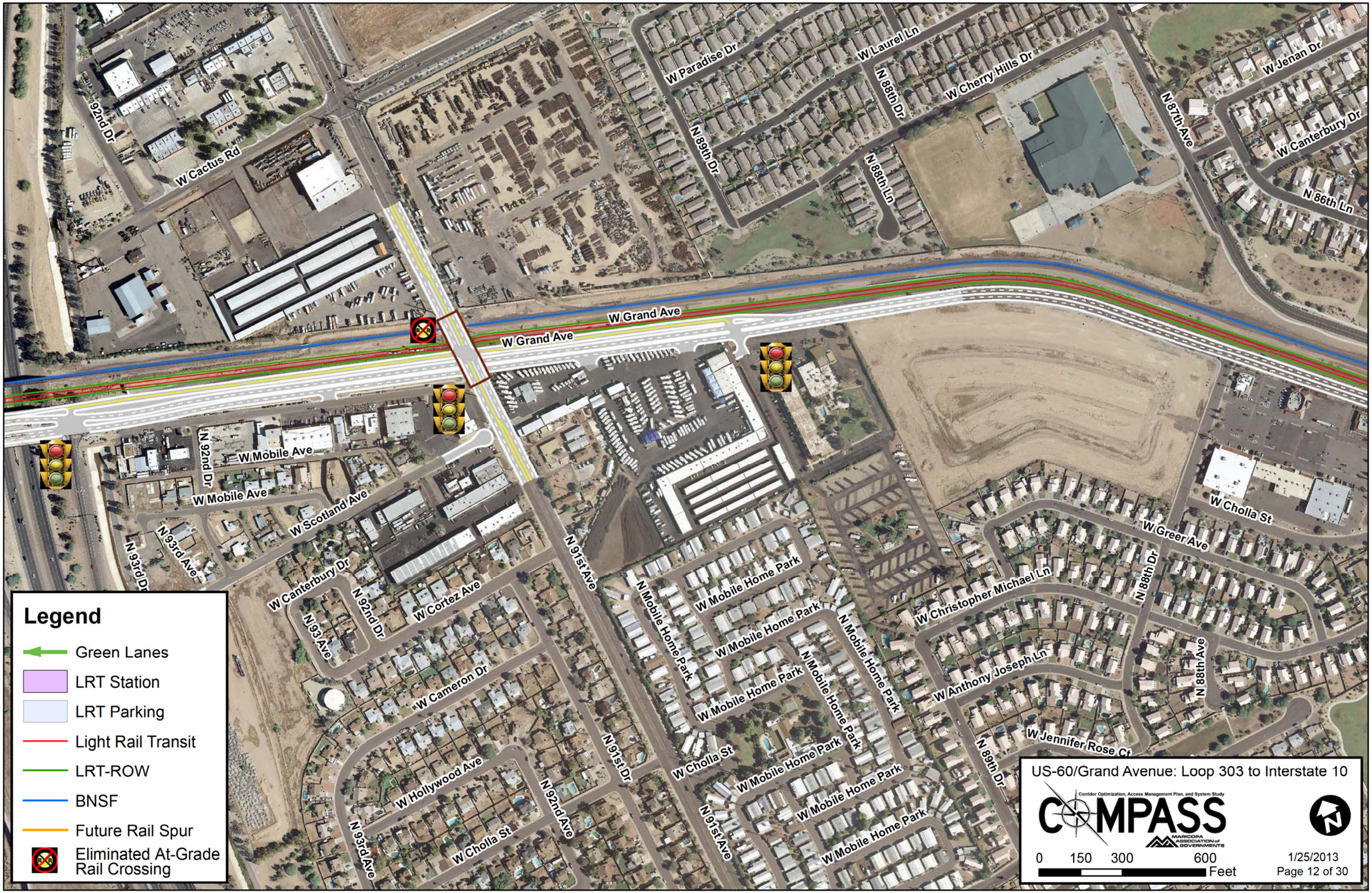
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W Cactus Rd
W Grand Ave
W Grand Ave
N 92nd Dr
W Mobile Ave
W Mobile Ave
W Scotland Ave
N 93rd Ave
N 93rd Dr
W Canterbury Dr
N 92nd Dr
W Cortez Ave
N 93 Ave
W Cameron Dr
W Hollywood Ave
N 93rd Ave
W Cholla St
N 92nd Ave
N 91st Ave
N 91st Dr
N Mobile Home Park
W Mobile Home Park
W Mobile Home Park
N Mobile Home Park
N Mobile Home Park
W Mobile Home Park
W Mobile Home Park
W Cholla St
N 91st Ave
W Mobile Home Park
W Mobile Home Park
W Mobile Home Park
W Cholla St
W Greer Ave
W Christopher Michael Ln
N 88th Dr
W Anthony Joseph Ln
N 88th Ave
W Jennifer Rose Ct
N 89th Dr
Legend
Green Lanes
LRT Station
LRT Parking
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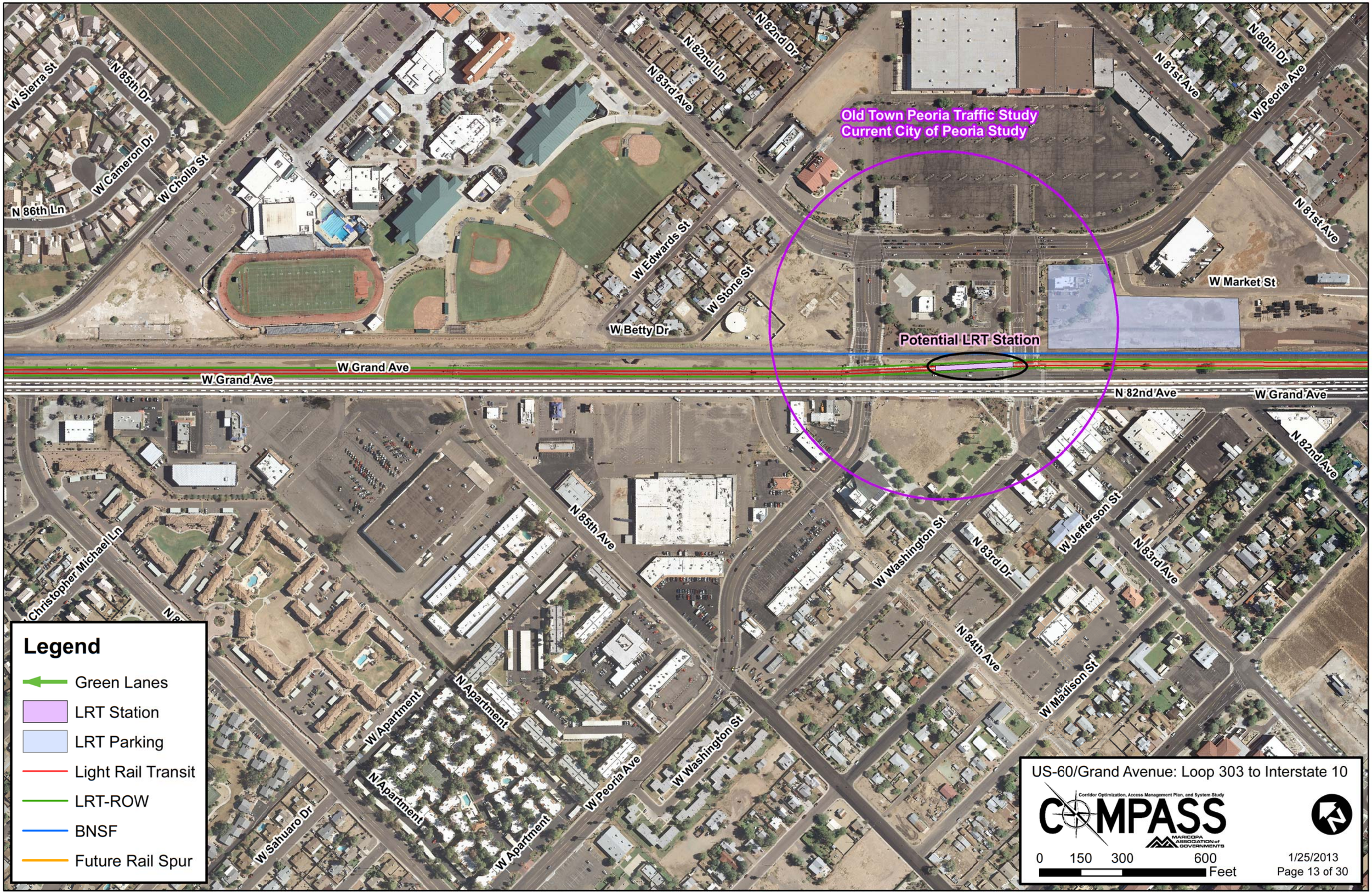
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W Cameron Dr
W Cholla St
N 86th Ln
N 83rd Ave
N 82nd Ln
N 82nd Dr
N 81st Ave
N 80th Dr
W Peoria Ave
N 81st Ave
W Market St
W Edwards St
W Stone St
W Betty Dr
W Grand Ave
W Grand Ave
N 82nd Ave
W Grand Ave
N 82nd Ave
N 85th Ave
W Washington St
N 83rd Dr
W Jefferson St
N 83rd Ave
N 84th Ave
W Madison St
Christopher Michael Ln
W Apartment
N Apartment
N Apartment
W Apartment
W Peoria Ave
W Washington St
W Sahuaro Dr
Legend
Green Lanes
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US-60 (Grand Ave) and 79th Ave
City of Peoria Potential US-60
(Grand Ave) Access Point

W Cheryl Dr
W Brown St
W Cinnabar Ave
N 77th Ave
W Mountain View Rd
N 75th Ave
N 75th Dr
W Vogel Ave
N 76th Dr
W Carol Ave
W Hatcher Rd
N Porter Ave
N 79th Ave
W Gold Dust Ave
N 81st Ave
W Market St
W Grand Ave
W Grand Ave
W Grand Ave
W Monroe St
View Rd
82nd Ave
82nd Ln
81st Dr
N 81st Ave
W Hatcher Rd
N 80th Ave
W Mission Ln
N 79th Ave
W Sanna St
N 79th Dr

Legend

- Green Lanes
- LRT Station
- LRT Parking
- Light Rail Transit
- LRT-ROW
- BNSF
- Future Rail Spur

US-60/Grand Avenue: Loop 303 to Interstate 10

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N 74th Dr
W Mission Ln
W Sanna St
W Eva St
N 73rd Ave
W Olive Ave
N 71st Ave
N Mobile Home Park
W Mobile Home Park
Maniac Expy
N Mobile Home Park
N Mobile Home Park
N Mobile Home Park
W Grand Ave
W Grand Ave
W Olive Ave
W Olive Ave
W Golden Ln
N 75th Ave
N 75th Ave
W Butler Dr
Legend
Green Lanes
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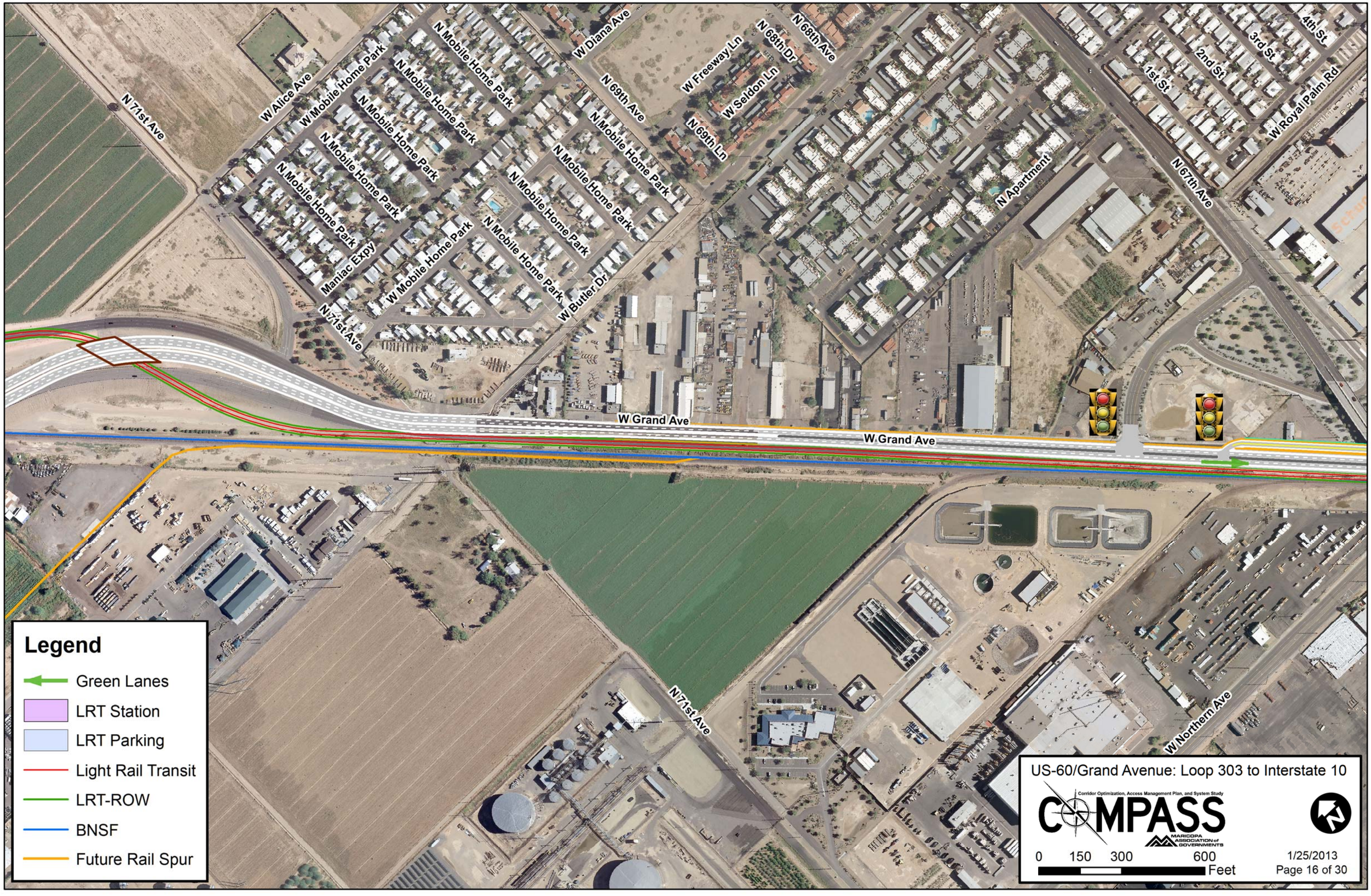
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W Mobile Home Park
N Mobile Home Park
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W Freeway Ln
N 68th Dr
N 68th Ave
W Seldon Ln
N 69th Ln
N Apartment
1st St
2nd St
3rd St
4th St
W Royal Palm Rd
N 67th Ave
Maniac Expy
W Butler Dr
W Grand Ave
N 71st Ave
W Northern Ave
Legend
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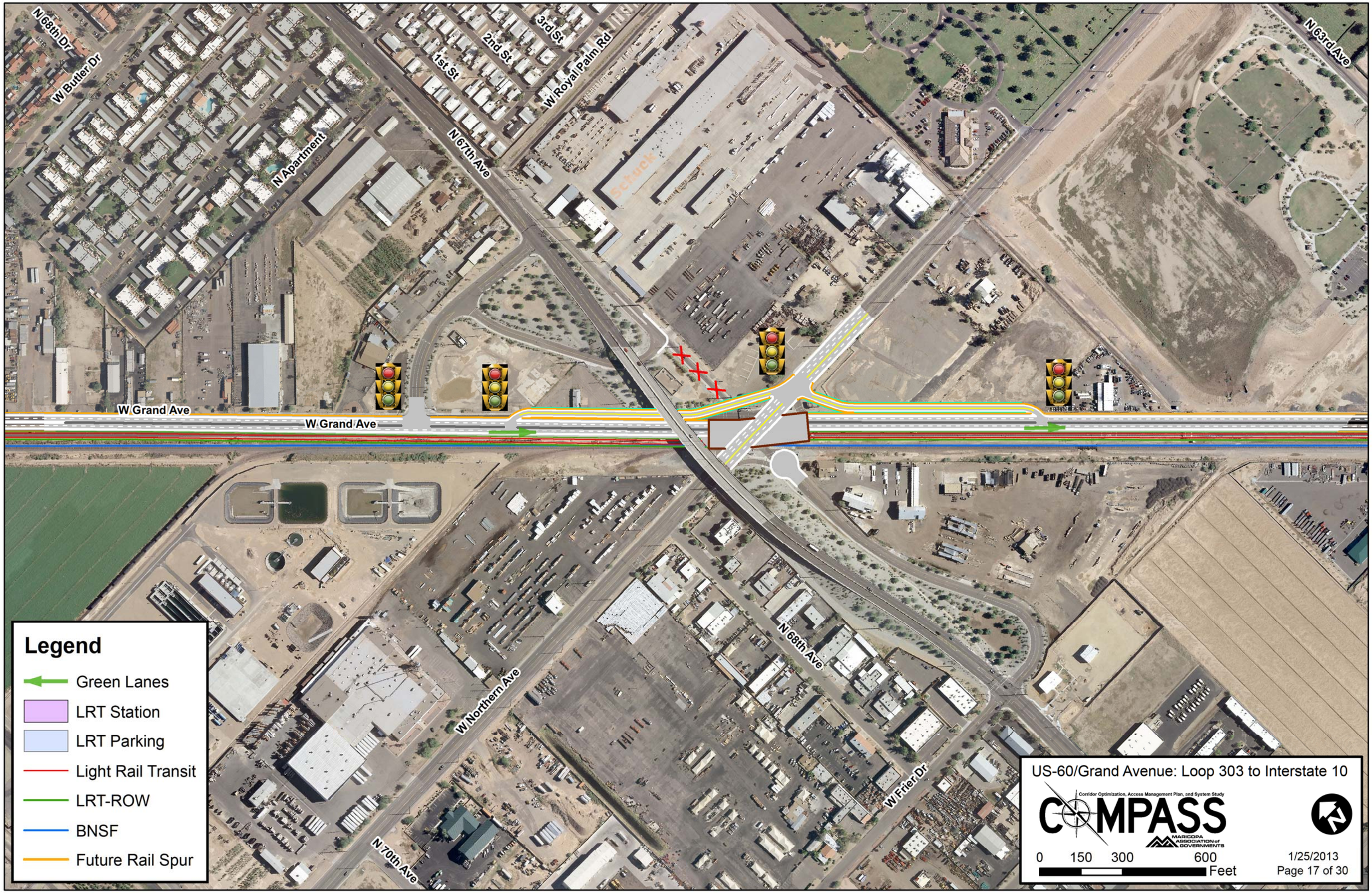
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Legend
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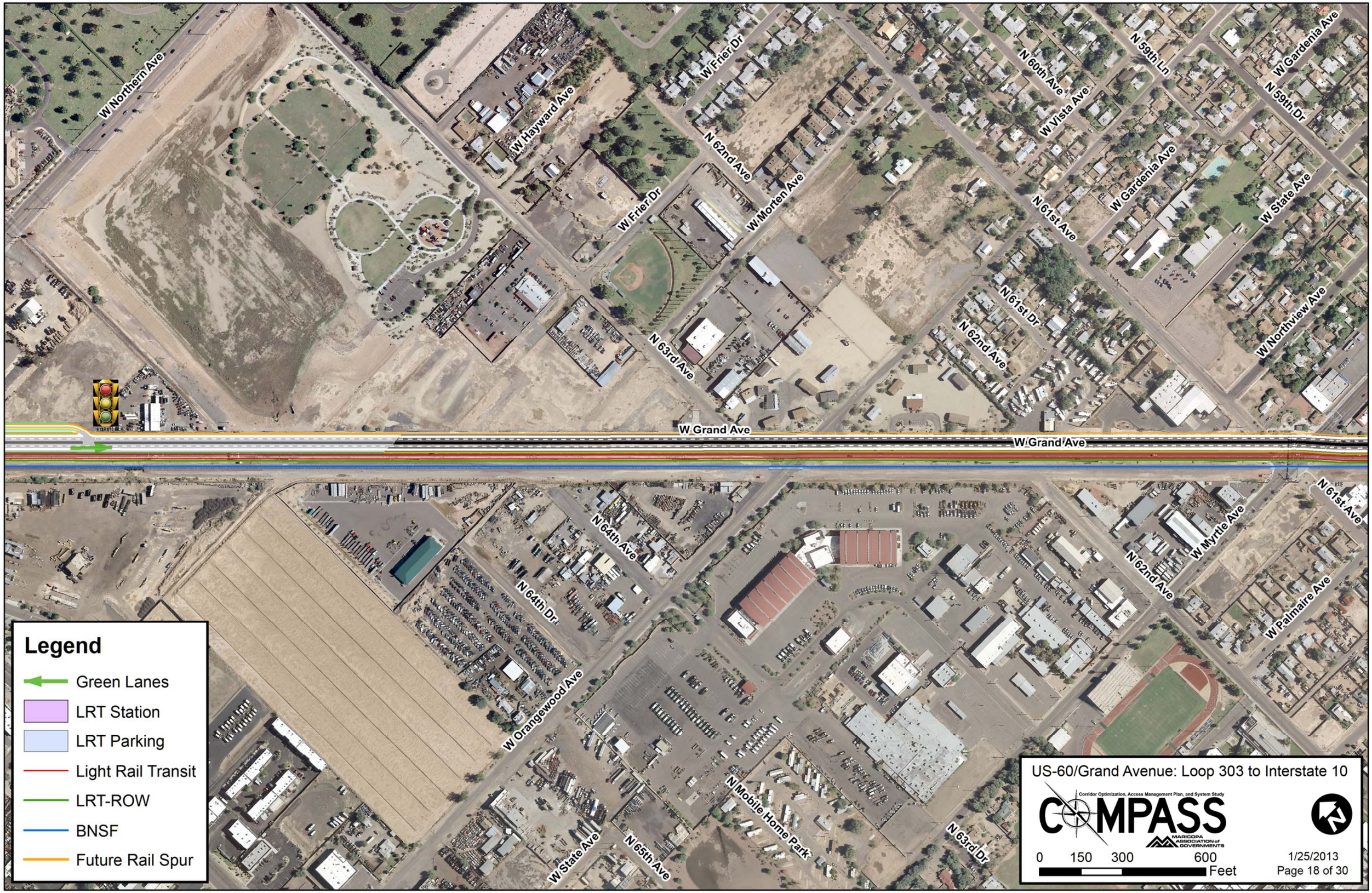
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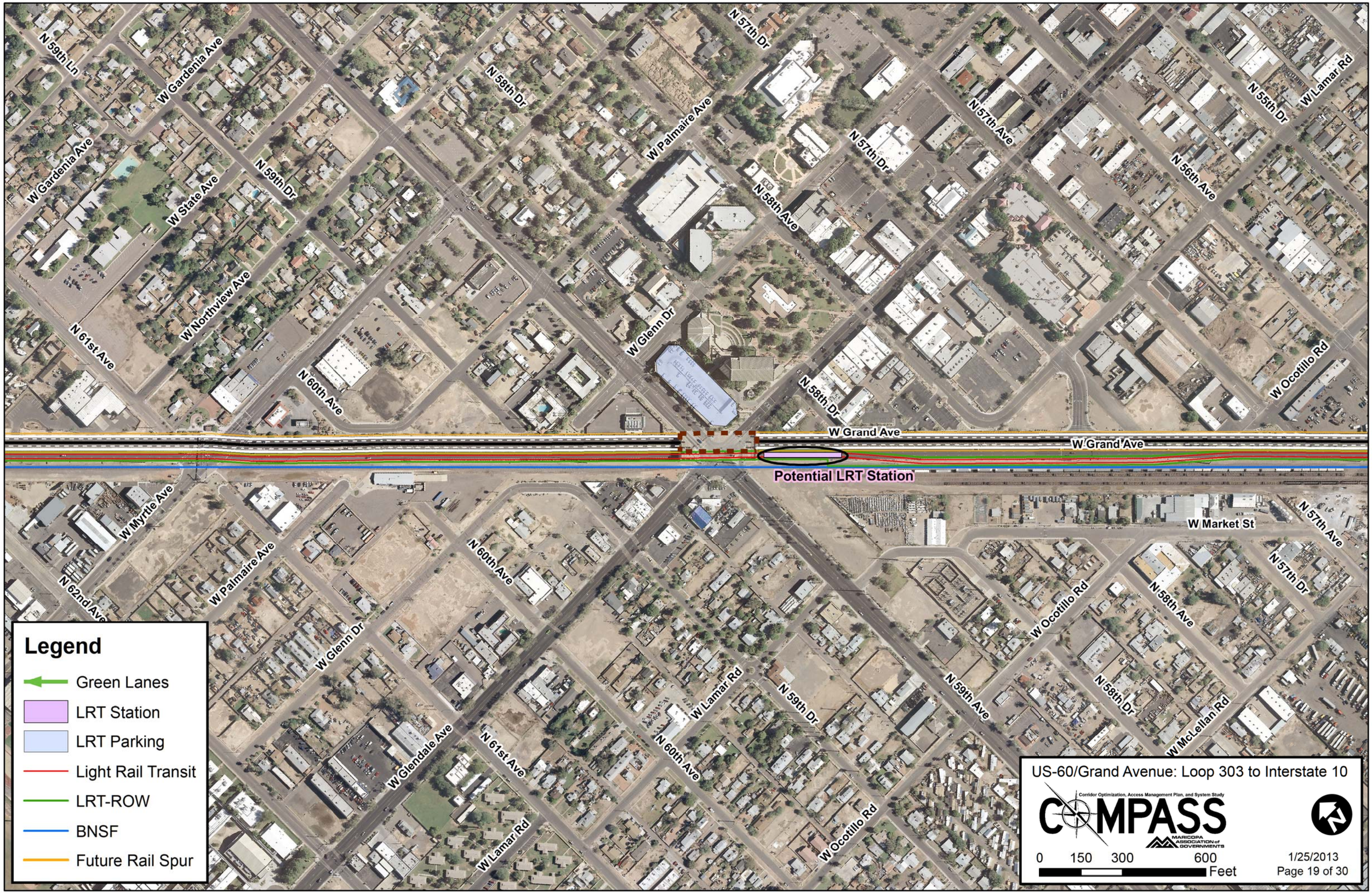
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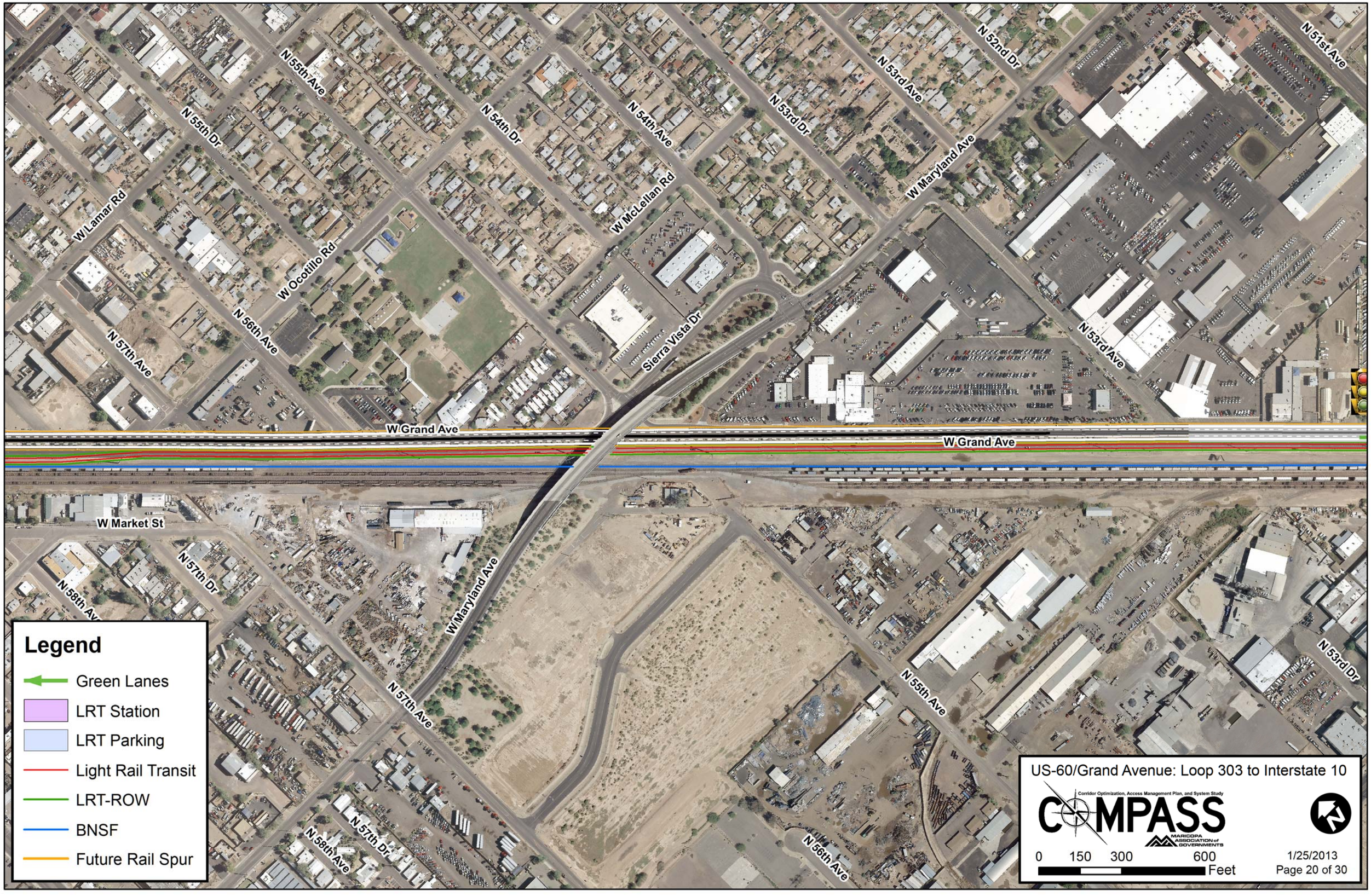
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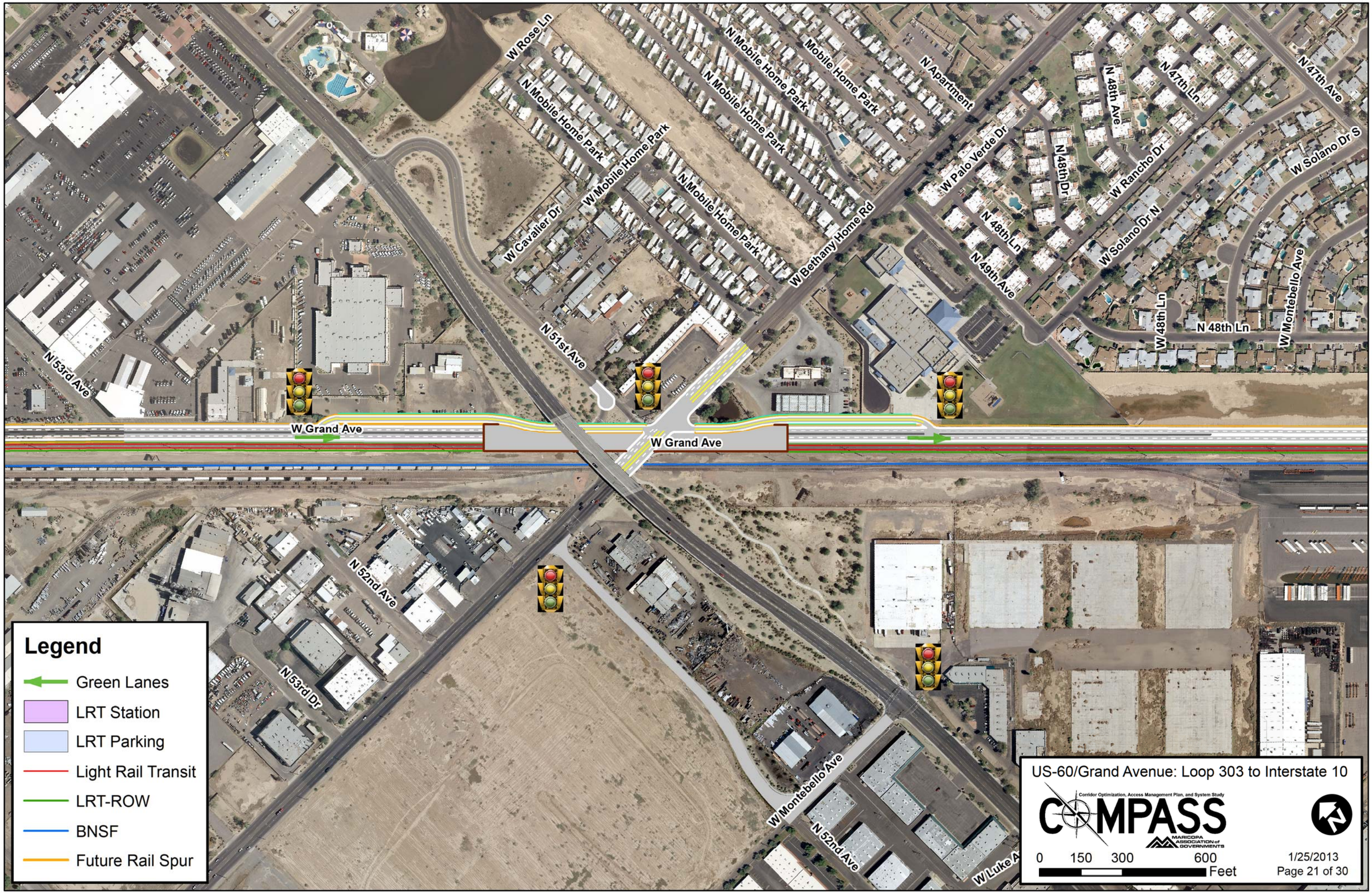
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Agave
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N Tom Murray Ave
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N 45th Ave
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N 39th Ave
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N 42nd Pkwy
W Medlock Dr
N 42nd Dr
W Pasadena Ave
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N 41st Dr
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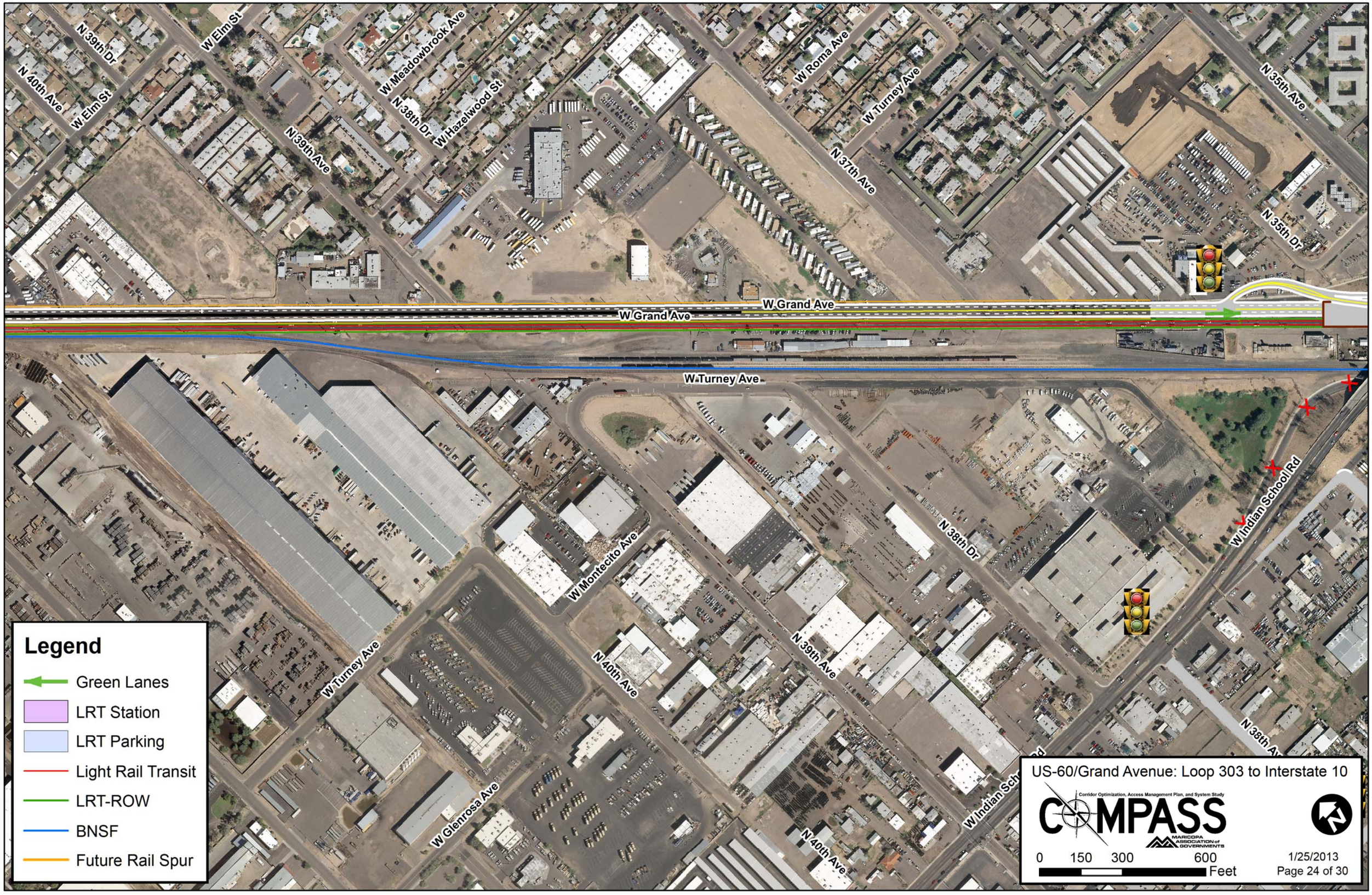
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W Clarendon Ave
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W Osborn Rd
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W Earll Dr
US HWY 60
W Grand Ave
W Grand Ave
W Osborn Rd
Grand Ave
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W Osborn Rd
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N 31st Ave
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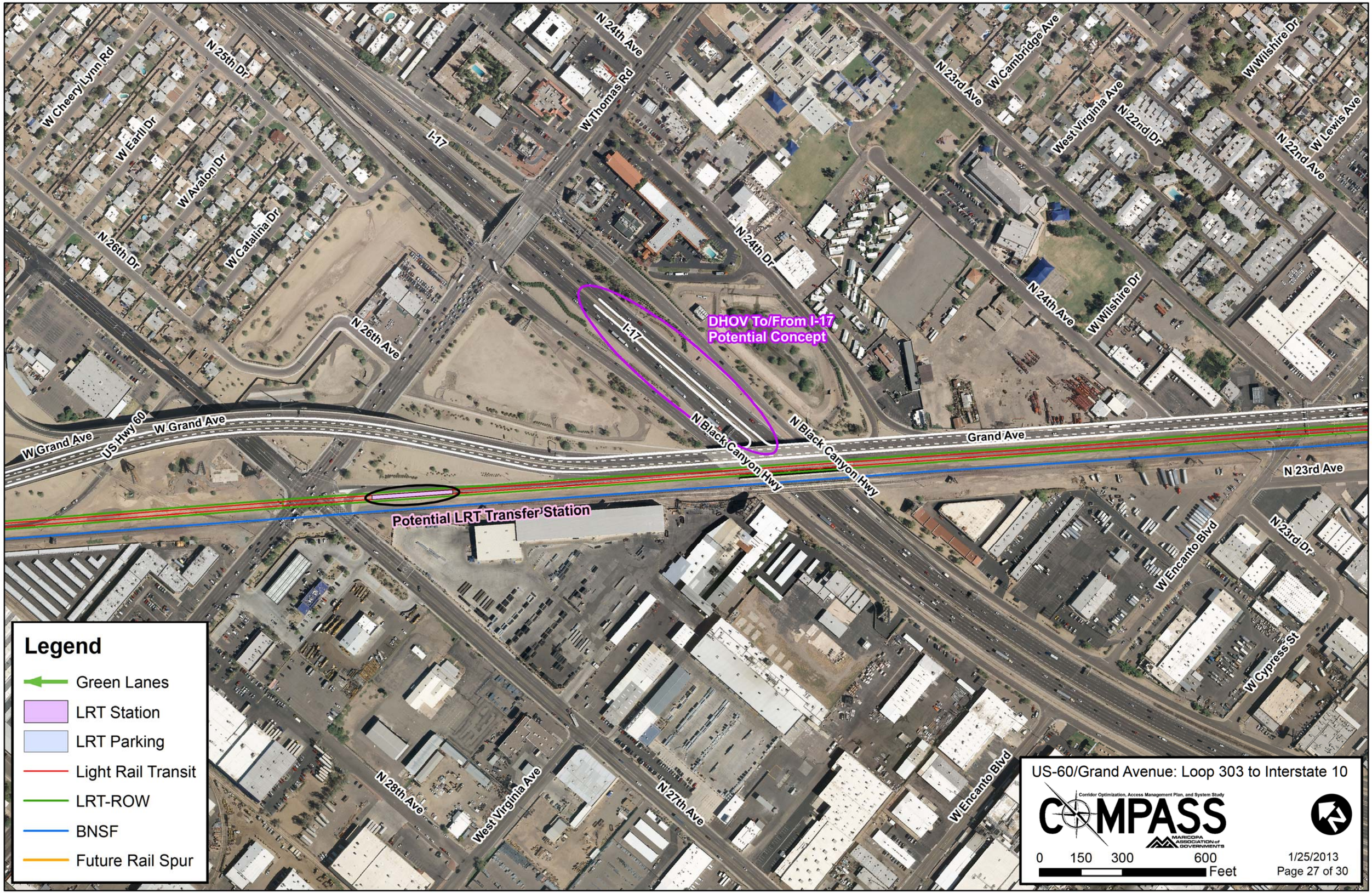
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Potential Concept
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N Black Canyon Hwy
Grand Ave
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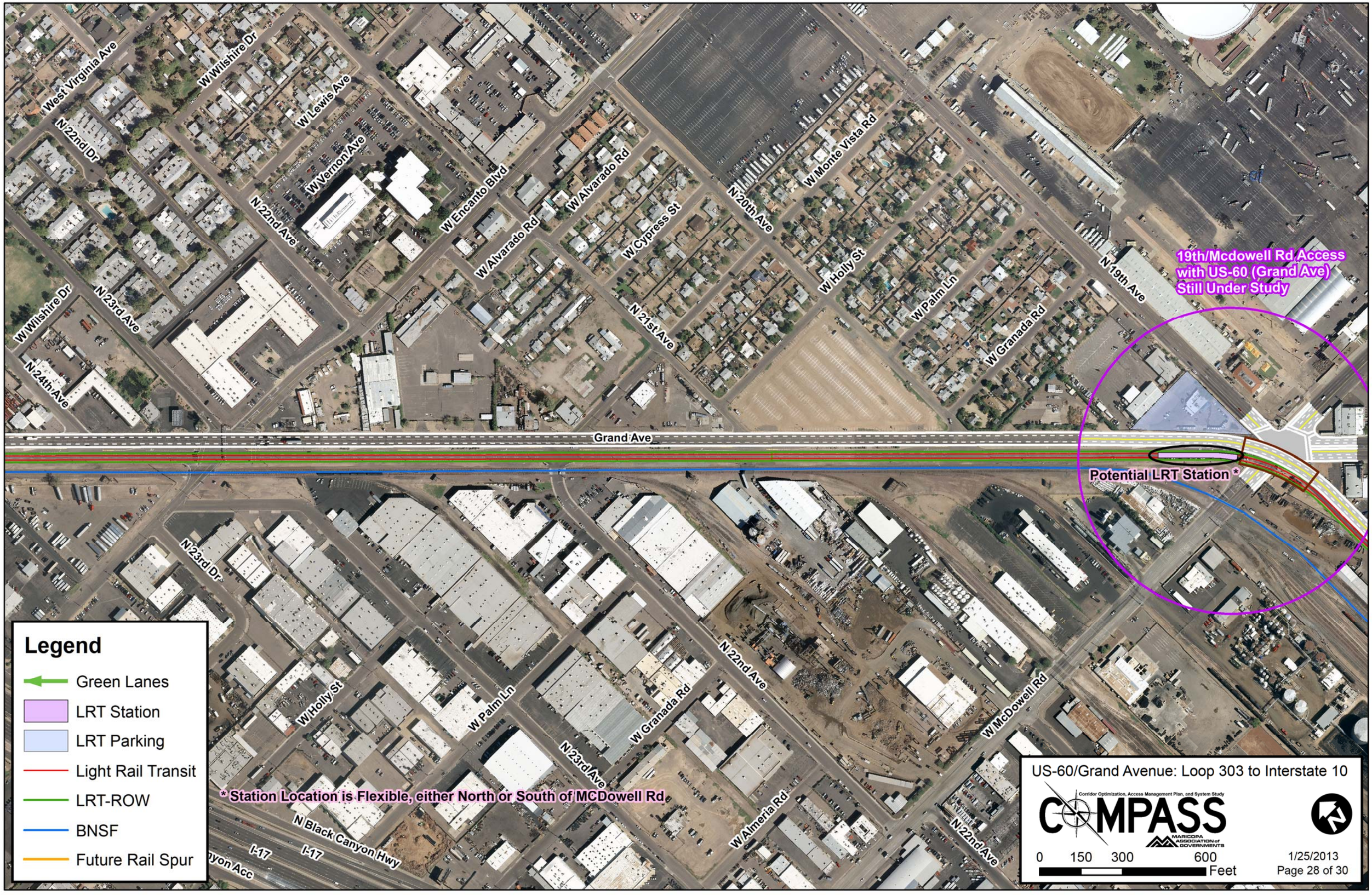
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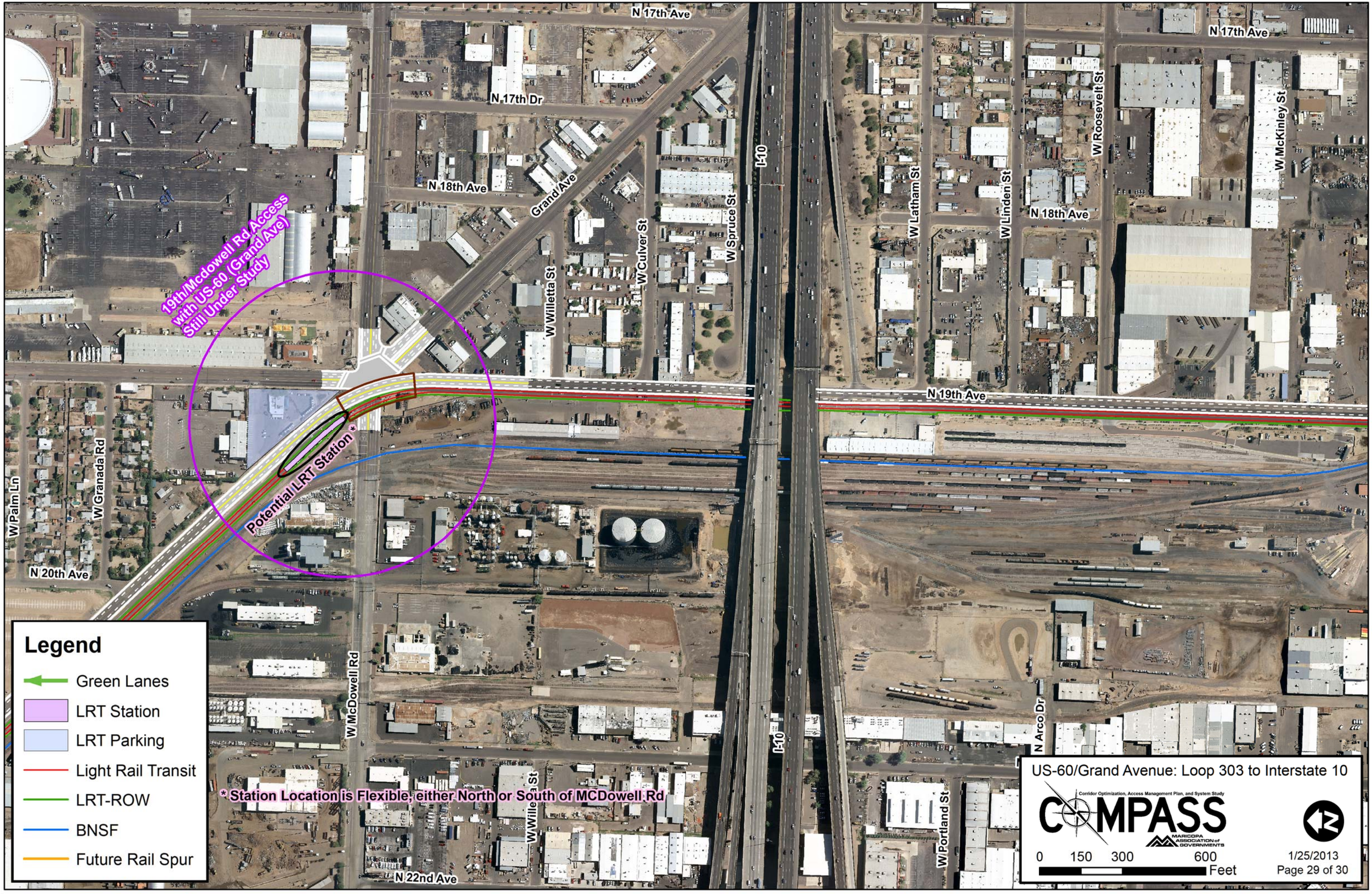
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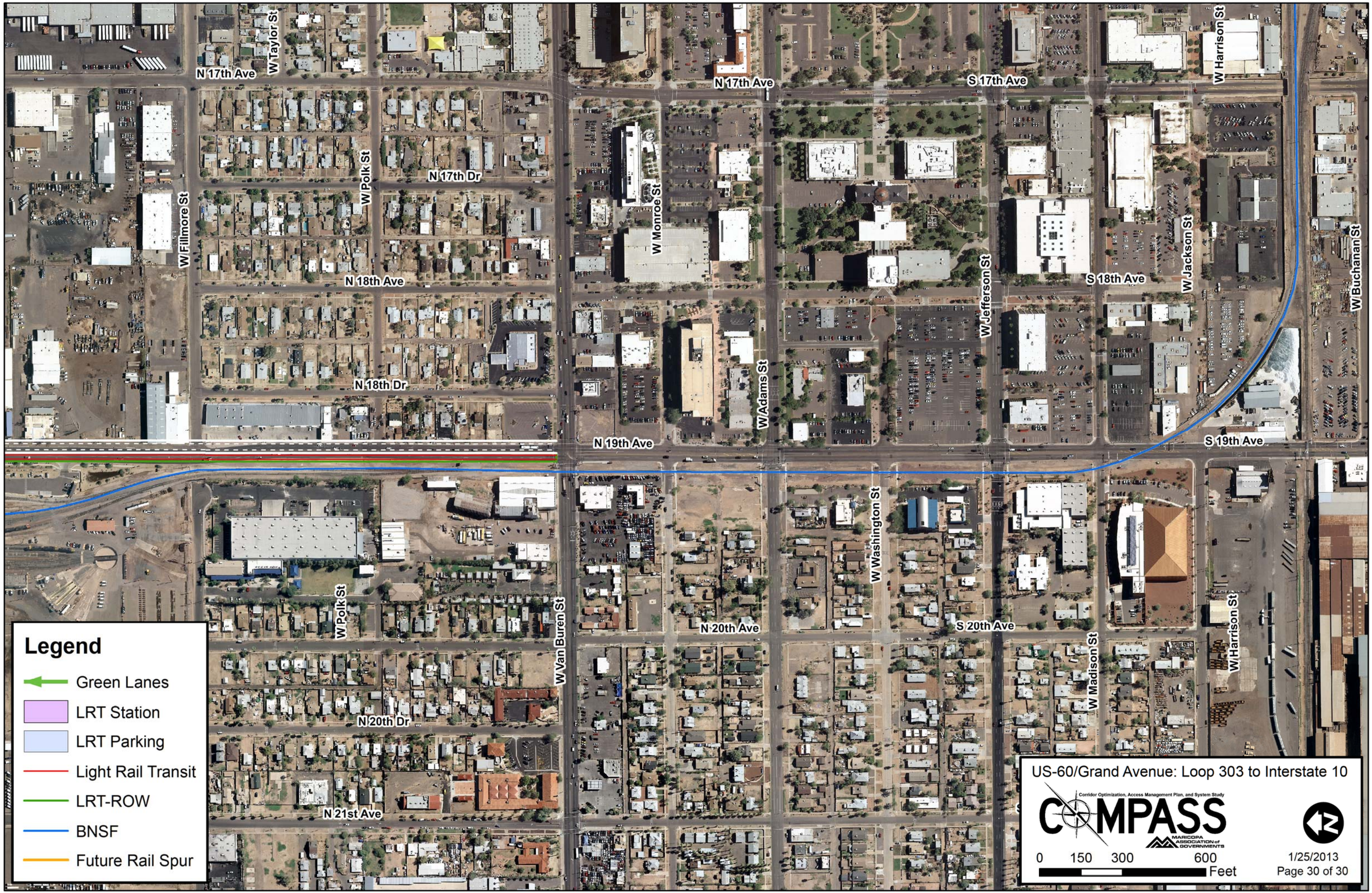
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APPENDIX TM5-4

HCT Preliminary Analysis

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MEMORANDUM

To: Bob Hazlett, MAG

From: Judie Scalise, ESI Corp

Date: February 26, 2013

Subject: U.S. 60/Grand Avenue COMPASS High Capacity Transit Analysis (HCT)

A very preliminary analysis was conducted by ESI Corp evaluating the Grand Avenue Corridor to identify the concentrations of population and employment between 7th Avenue and Meeker Boulevard, approximately 23 miles. **Based on MAG's review of these findings combined with conversations with consultant team members and planning partner members, it was determined that further analysis of the corridor for high capacity transit (HCT) maybe warranted.**

Summarized Findings

Analysis of the corridor was conducted utilizing data at the zip code level, which included the MAG Employment Database, zip code business patterns, and the U.S. Census, America Community Survey. The statistics that were evaluated included population, housing units, employment and number of establishments. Based on this research, nine areas along the Grand Avenue Corridor were identified which have a mix of characteristics that are important to HCT, including density of population and housing, concentration of employment and the presence of large employers within proximity to the corridor.

- Meeker Blvd.
- Bell Rd.
- Just north of Thompson Ranch Rd.
- 103rd Ave.
- Between 83rd Ave and Peoria Ave.
- 59th Ave.
- 43rd Ave.
- 27th Ave.
- 19th Ave.

According to the Urban Land Institute the minimum density for supporting HCT is 125 employees per acre and transit to downtowns of 20 to 30 million square feet. Grand Avenue connects to Downtown Phoenix, one of the largest employment centers in Maricopa County. The Phoenix CBD[1] contains between 16 to 17 million square feet of office space which equates to roughly 153 to 165 employees per acre.[2] This square footage is understated since it does not include healthcare or retail space. Consequently healthcare employment within hospitals or retail employment is not included in the employee per acre calculation, which would add to the total employees per acre for the CBD.

As the economy continues to strengthen and business confidence returns, there is the opportunity to revitalize the Grand Avenue Corridor by fostering economic development. Along this 23 mile stretch, Grand Avenue serves as the spine which connects six cities and the unincorporated communities of Sun City. Nowhere else in the Valley will you find this number of communities proximal to one another within the same distance. The diversity in the economic makeup and resident population of these cities can be leveraged as a benefit to promote commercial and residential development within a HCT corridor.

Next Steps

By 2030 it is anticipated that the Grand Avenue Corridor will experience a 41 percent increase in population and a 52 percent increase in employment. It has already been determined by MAG that this growth will result in the need for roadway improvements and transit service along the Corridor. In fact, a commuter rail study was finalized May 2010 which evaluated the Grand Avenue Corridor for its potential for HCT.

The Sustainable Transportation and Land Use Integration Study (ST LUIS) provided a comprehensive analysis of 40 corridors throughout the Valley to assess their potential for HCT. For comparison purposes, an assessment of Grand Avenue will be conducted applying Step One of the HCT readiness analysis framework from the ST LUIS study. Further, a review of MAG's preliminary work on the Northwest Valley Transit Study will be performed whose preliminary findings will help inform the Grand Avenue HCT analysis. Last, supplementary to this analysis will be a discussion on HCT and land use and its effect on economic development and redevelopment.

[1] CBD boundaries used in this analysis included Camelback to the north, I-10 to the south, 7th Avenue to the west and 7th Street to the East.

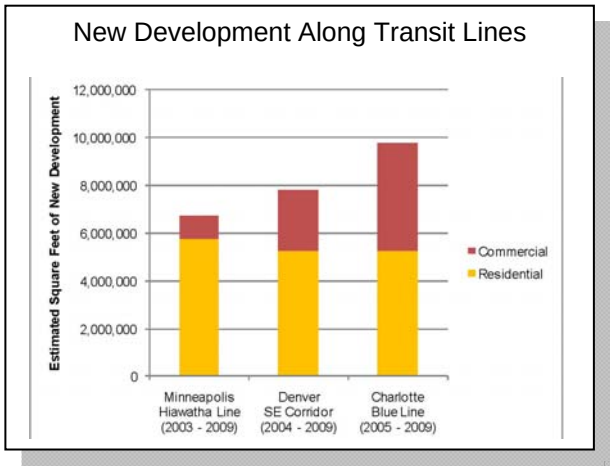
[2] Assuming 200 square feet per employee

HCT as an Economic Development Catalyst

There are a number of economic development benefits that result from HCT, including the ability to attract a workforce, clustering of employment types, and the stimulation of redevelopment. Following are discussion points to consider.

- Transportation projects have always been a catalyst for economic development. Freeways connect communities and provide access to new markets, railroads transport people and the delivery of raw materials and goods, and HCT has been documented to stimulate a variety of new development and redevelopment opportunities, including high density residential and mixed use projects offering a wide variety of amenities.

- Projects near transit are viewed as having the potential to achieve faster absorption rates, higher occupancy rates, and in some cases higher sales prices or rents. This type of real estate performance is very attractive to the development community who bring their resources and expertise. They can help communities achieve beneficial goals such as affordable housing, revitalization of neighborhoods and job creation.



- HCT has implications for the workforce. Young workers in the knowledge based sectors prefer to live in more pedestrian and bicycle friendly urban areas. This group values convenience in terms of proximity to work, shopping, services and fun. According to the Department of Transportation, there is a trend among young people between 21 and 30 years of age. Unlike prior generations, the share of automobile miles driven by this group has dropped from 20.8 percent in 1995 to 13.7 percent in 1990.

- The Millennial Generation numbers 80 million strong in the U.S. and is entering the housing market with a force. This demographic will earn less than the overall median income and will require affordable rental housing and starter homes. Housing affordability will become a key issue for communities in attracting and retaining an adequate workforce. Communities that fail to address affordability will see their workforce stagnate as Boomers retire and younger workers search for more attractive living environments elsewhere.

Transportation policies and evaluation practices are mobility-based, such as the U.S. 60 Grand Avenue COMPASS (maximize travel speed and distance) however, there is a growing awareness of the need for accessibility-based planning, which refers to people's needs to reach desired services and activities. Growing opportunities arise from new transportation developments. In order to change the economic potential of Grand Avenue there should be some consideration for HCT and how that can be leveraged to enhance real estate values, attract private sector investment, attract transit oriented industries and increase tax revenues.

APPENDIX TM5-5

ST-LUIS Step 1 HCT Analysis

US-60/Grand Avenue COMPASS High Capacity Transit Analysis (HCT)

PREPARED BY:

ESI CORPORATION

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February 2014

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1. BACKGROUND

This analysis supplements the original research conducted by ESI Corp under the US-60/Grand Avenue Corridor Optimization, Access Management, and System Study (COMPASS) project and examines the potential for High Capacity Transit (HCT) of nine possible transit stops identified along Grand Avenue. These include:

- Meeker Blvd.
- Bell Rd.
- Thompson Ranch Rd.
- 103rd Ave.
- 83rd Ave.
- 59th Ave.
- 43rd Ave.
- 27th Ave.
- 19th Ave.

The research approach utilized by ESI Corp follows the Sustainable Transportation and Land Use Integration Study (ST LUIS) prepared by ARUP North America. A two step approach is outlined in their November 7, 2011 memo on Supportive High Capacity Transit Corridor Technical Analysis. For the purposes of this analysis, an abbreviated version of their methodology was utilized, and six elements of the Step 1 criteria were assessed. Additionally, the ST LUIS analysis was centered on evaluating multiple, different corridors and their HCT readiness, while the COMPASS HCT Analysis focuses on transit stops along one corridor – Grand Avenue.

EVALUATION FRAMEWORK

The Step 1 analysis within the ST LUIS evaluation process is a high level screening of eight weighted criteria to identify transit stops' characteristics that have the potential to support HCT. The transit stops that meet a minimum criteria advanced to the next level of analysis called Step 2. The analysis undertaken by ESI on the nine transit stops was modified and only includes Step 1, with an evaluation of six of the eight criteria, including:

- Total Population
- Percent of Minority Population
- Percent Low Income Households (under $20,000/Year)
- Total Employment
- Transit-Supportive Density (Jobs + Residents/ Gross Acre)
- Transit-Supportive Job Density (Jobs/ Gross Acre)

Each of the six criteria is scored from 1 to 5, noted in Table 1, with transit dependent/supported population/conditions weighted more heavily. A composite score of 50 is the maximum number of points that could apply per stop. The ST LUIS analysis defined transit supportive jobs as those that fall within government, entertainment and knowledge based sectors.

Table 1 - Weighting by Criteria			
Code	Criteria	Proposed Weighting	Max Points per Criteria (with 1-5 rating scale)
S1-1	Total Population	1	5
S1-2	% of Minority Population	2	10
S1-3	% Low Income Households (under $20,000/Year)	2	10
S1-4	Total Employment	1	5
S1-5	Transit-Supportive Density (Jobs + Residents/ Gross Acre)	2	10
S1-6	Transit-Supportive Job Density (Jobs/ Gross Acre)	2	10
		Total Points:	50

Source: ST LUIS Study

The resultant score for each criteria is categorized within one of five quintiles based on performance, as noted in Table 2. Transit stops scoring in the top 20 percent are assigned 5 points, with transit stops scoring in the next 20 percent receiving 4 points, and so on.

Table 2 - Transit Stop Scoring Range by Quintile						
	# of Points	1	2	3	4	5
Code	Criteria	Bottom Quintile (under 20th percentile)	Second Quintile (between 20th to 40th percentile)	Third Quintile (between 40th to 60th percentile)	Fourth Quintile (between 60th to 80th percentile)	Top Quintile (above 80th percentile)
S1-1	Total Population	< 24,025	22,4,025-34,966	34,967-50,512	50,152-85,840	85,840+
S1-2	% of Minority Population	< 26%	26%- 36.9%	37%- 53.9%	54%- 63.9%	64% +
S1-3	% Low Income Households (under $20,000/Year)	< 12.5%	11.5%-16.9%	17%- 19.4%	19.5%-25.4%	15.5% +
S1-4	Total Employment	< 12,830	12,830-23,499	23,500-37,899	37,900-56,000	50,798+
S1-5	Transit-Supportive Density (Jobs + Residents/ Gross Acre)	< 4	4.0- 11.9	12.0- 17.9	18-26.9	27 +
S1-6	Transit-Supportive Job Density (Jobs/ Gross Acre)	< 0.85	0.85-1.08	1.09-1.91	1.9-2.70	2.70+

Source: ST LUIS Study

2. HCT ANALYSIS FINDINGS

Each transit stop encompasses a 1/2 mile buffer of the transit stop. Data utilized by ESI Corp in the analysis includes MAG's 8M socio economic dataset at the TAZ level, and supplemented with U.S. Census data. If a TAZ boundary is partially within the 1/2 mile buffer, then all of the data for that TAZ is included. Transit jobs and transit job density is derived utilizing U.S. Census data at the two-digit NAICS level and applying a percentage of transit jobs to TAZ population.

Table 3 provides a side-by-side comparison of the results for each HCT stops. Thompson Ranch has the highest percentage of low-income households and the largest ratio of transit supported density, while 27th Avenue has the highest number of jobs, the greatest minority population and numerically ties for households without vehicles. The 103rd Avenue corridor, which includes a portion of Sun City, also has the largest number of households without a vehicle and the highest household density.

For information purposes two screening criteria from Step 2 (Household density and Households without a car) was analyzed and is included in the following table for information purposes only. It is not included in the Step 1 scoring tabulation.

Table 3 - HCT Stops, Step 1 Results

	Meeker	Bell	Thompson Ranch	103Ave	83rd Ave	59th Ave	43rd Ave	27th Ave	19th Ave
Population	19,681	22,190	23,549	7,487	**38,926**	26,525	24,496	14,658	11,884
Employment	13,616	12,475	7,817	5,296	14,279	17,687	14,600	**28,320**	11,269
Minority Population	6.7%	22.0%	58.2%	5.9%	41.7%	48.7%	52.3%	**64.3%**	27.7%
Low Income Households	24%	30%	**51%**	33%	15%	41%	30%	38%	40%
Transit Supported Density (jobs+pop/acres)	6.3	7.6	**14.3**	4.0	12.1	12.2	11.0	8.2	8.9
Transit Supported Job Density (jobs/acres)	1.0	1.3	1.1	0.5	0.9	1.8	1.4	**2.8**	2.1
Household Density (housing units/gross acres)	2.1	1.8	1.2	**3.2**	2.4	1.2	2.2	1.0	1.3
Households without a Vehicle	6%	9%	4%	**20%**	5%	15%	10%	**20%**	15%

Source: MAG, U.S. Census Block
Notes: Some corridors may overlap geographically with others. Households in these overlapping areas are included in the totals for each corridor; Transit -supportive jobs are defined as jobs in the government, entertainment and knowledge based sectors

FINDINGS

As it relates to the ST LUIS HCT Corridor Analysis, transit stops that met or exceeded a 60 percent threshold were carried forward to Step 2 for further screening. Pertaining to the US-60/Grand Avenue COMPASS Study, there are four out of nine potential station stops that meet or exceed this 60 percent threshold including Thompson Ranch Road, 59th, 43rd, and 27th Avenues. Falling just below the

threshold of 30 points is 83rd Avenue with a score of 29. The detailed table on the corridor score by criteria is included as Appendix A.

Table 4 - HCT Stops, Composite Score

Corridor	Score (out of 50)	Advance to Step 2
Meeker Blvd.	24	
Bell Rd.	24	
Thompson Ranch Rd.	32	✔
103rd Ave.	26	
83rd Ave.	29	
59th Ave.	32	✔
43rd Ave.	32	✔
27th Ave.	32	✔
19th Ave.	26	

All of the proposed HCT stops would be classified by ST LUIS as suburban in nature, meaning they have less than 15 persons per acre. Based solely on existing land uses and density, the ST LUIS place type characteristics defined high capacity oriented density at 45+ persons per acre. The dominant land use for high capacity transit is mixed use, employment/office and regional uses, such as universities, healthcare, etc.

Presently none of the HCT stops in this analysis display the high capacity density, yet some of these stops have a concentration of employment and regional uses that include healthcare, retail and professional services.

TRAVEL DEMAND GENERATORS

The Northwest Valley Sub-Region of Maricopa County recently underwent a transit study to determine the desires of residents relative to transportation needs and to quantify the increase in transportation demand that has resulted from population growth. In order for HCT to be successful research has demonstrated that a critical mass of people and jobs must be present around the stations to support the system. The distance of origins and destinations from transit stations has a strong influence on whether people use transit to get to and from their destinations. Community surveys were conducted in the Northwest Valley to understand the reasons for a typical travel purpose. The most typical trip purpose for study area respondents was Shopping at 26 percent. Recreation/social (18 percent), Healthcare (18 percent), Personal business (17 percent), and Work (15 percent). The majority of the trips made were between cities (as opposed to within their own community).

Enhancing the effectiveness of HCT is possible by having a transit feeder system in place. Major trip generators identified within the Northwest Valley are along Grand Avenue and include Banner Del E. Webb Medical Center, Surprise Town Center, Banner Boswell Medical Center and Peoria High School. Aspects of successful transit include the connection of hubs that facilitate transfers to other hubs or commercial centers that connect people to shopping, work, healthcare and other needs; providing service to denser corridors of housing and concentrated retail and employment destinations, and servicing lower income populations and those without vehicles.[1] One of the long term recommendations of the Northwest Valley Local Transit System Study is supporting the eventual implementation of high-capacity transit service from Surprise to Downtown Phoenix.

[1]Northwest Valley Local Transit System Study, MAG, June 2013.

3. TRANSIT, LAND USE AND ECONOMIC DEVELOPMENT

According to the Urban Land Institute there are several fundamental economic and demographic forces that will shape urban development over the existing decade. Among them includes lifestyle choices among the Millennial Generation, extended employment among Boomers, potential demand for senior housing, rising transportation costs, and public sector shortfalls on repairing, rebuilding and repurposing existing transportation infrastructure. Business site location decisions also play a role in influencing land use and real estate investment. The desire of businesses to geographically cluster with similar and complementary businesses and be proximal to customers and/or a workforce gives rise to employment centers.

Looking ahead, several key questions regarding the relationship between HCT, land use and economic development emerge, such as, what are the demographic trends that are fostering the desire for transit related development, how does transportation infrastructure effect market value, how will planners integrate multimodal infrastructure initiatives into future land use design, and how will projects be implemented. Underlying this is the overriding goal to foster development and redevelopment that will produce corresponding land use outcomes such as mixed use development, higher density residential, and employment centers. Done correctly these newly created HCT centers can connect to regional networks and link downtown cores, airports and other mass transportation systems.

Did you know.....

- *People who live near transit are likely to use transit. (Reconnecting America and CTOD)*
- *Transit share of the commute trip is highly correlated with population and employment density. (Reconnecting America and CTOD)*
- *Of all transit related trips, work related ones comprise the majority. (Reconnecting America and CTOD)*
- *Some jobs are more transit oriented than others and those jobs are projected to grow.(CTOD)*
- *Housing values within proximity to fixed-guideway transit have maintained their value compared to residential properties without transit access. (American Public Transportation Association)*
- *Consumers are willing to pay more for housing located in areas that are walkable, have higher density, a mix of uses, as well as access to jobs and amenities such as transit. (American Public Transportation Association)*

DEMOGRAPHIC SHIFTS AND CHANGING CONSUMER DEMAND

The Great Recession took a toll on wealth generation in this country leaving many workers with diminished home values and retirement savings. The number of rental households increased by 1.1 million since 2011; the largest annual increase since the early 1980's. The 25-35 year old age cohort, in large part, fueled the rental market from 2006 to 2011.[2] Boomers, the other large demographic group, have been embracing pedestrian friendly places as they move into the 65+ age bracket. Seniors use of public transit increased 328 million more trips from 2001 to 2009 (Transportation for America). For those on a constrained budget access to mass transit is vital for getting around. *Transportation for American* reports that the miles driven per American has been dropping and that the millennial generation (16-34) is driving nearly one-fourth less now than those who where the same age a decade ago. Americans desire to be closer to shopping districts and mass transit lines to get to work.

TRANSIT AS AN AMENITY

Creating mixed use corridors that connect nodes of activity and are anchored by residential and employment has proven to be successful in many major markets across the U.S. Projects near transit are viewed as having the potential to achieve faster absorption rates, higher occupancy rates, and in some cases higher sales prices or rents. Neighborhoods that connect most directly and easily to urban nodes and downtown centers will gain advantages over less convenient exurban locations.

Over the years numerous studies have been conducted evaluating the relationship that transit has on property values. The findings overwhelming indicate that properties that were located near a transit station experience an increase in value compared to properties that did not have transit access. Conditions which optimize transit's influence on property values is the system's regional connectivity and frequency of service. According to the Center for Transit Oriented Development, "transit systems that do a good job in linking workers to employment centers have better potential to generate higher land values."

Several factors have been identified which are necessary to facilitate enhanced real estate values, including:[3]

1. Good economy and a healthy real estate market that transit development can take advantage of.
2. Supportive public policy that leverage transit added value by allowing density bonuses, reduced parking requirements, and incentives.
3. Existence of traffic congestion that serves as an inducement for residents and the workforce population to abandon their car and find alternative modes of transportation.

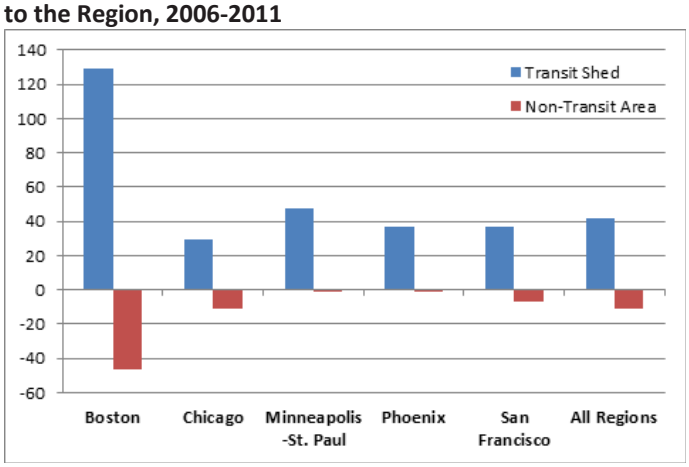
In a recent study conducted by the American Public Transportation Association with the National Association of Realtors, they analyzed transit sheds in five regions of the country and concluded that

[2] "The State of the Nation's Housing 2012." The Joint Center for Housing Studies of Harvard University.
[3]Professor Robert Cervero, U.C. Berkeley.

transit sheds outperformed the region as a whole by 41.6 percent. Boston station areas outperformed the region the most at 129 percent with Phoenix at 37 percent. Additional findings include:[4]

- Transit type had an effect on the resilience of property values, which benefited more from transit that was well connected and had a higher frequency of service. Stations with higher levels of transit access saw the most price resilience within and across regions.
- No consistent trends have emerged with regards to residential property type. For most property types, the transit shed outperformed the region, and in Boston and Chicago this holds true for all property types.

Percent Change in Average Residential Sales Prices Relative to the Region, 2006-2011



Source: American Public Transportation Association and the National Association of Realtors

- In addition to more resilient residential property values, households living in transit sheds had better access to jobs and lower average transportation costs than the region as a whole.

LAND USE DESIGN THAT EMBRACES HCT

It is particularly important that land use and development professionals work together to ensure that community plans for HCT have a pedestrian scale, are realistic and reflect sound development principles. Plans may need to be phased, and over time modified to reflect changes in market conditions, land ownership, community goals, economic prospects or consumer preferences. Successful transit developments leverage real estate opportunities as a priority, as opposed to fostering low-cost transit solutions which could decrease rider accessibility and diminish opportunities for higher density that fosters economic growth around stations.

A fundamental building block for attracting residents to transit is ensuring walkability of the area and pedestrian connectivity. Too much parking has been pointed out as an inhibitor by making the area less pedestrian friendly and wasting space that could be used for mixed use development that fosters ridership. Standard parking ratios need to be evaluated relative to the layout of the station and its connectivity to the surrounding community. The Center for Transit Oriented Development has shown that homeowners in walkable communities with a mix of uses and good transit access own 43 percent fewer cars than those who live in suburban communities.

[4] "The New Real Estate Mantra, Location Near Public Transportation," March 2013.

In addition, bicycling is experiencing unprecedented growth in U.S. cities as mayors and transportation planners appreciate the multiple benefits and low-cost of investing in bicycling. The number of people riding bikes frequently has grown 40 percent nationwide and 63 percent in the nation's largest cities in the past decade.[5] Bicycling is a cost effective and zero-carbon solution to fill the gap of door-to-door service, referred to as the "first and last mile." By incorporating within transit stations and mixed use centers full service bike racks and lockers, the major concerns of theft and accessibility can be addressed.

Transit ridership comes from every economic spectrum, consequently housing should reflect a variety of price points to capture a mix of incomes and a variety of age groups. Adding and maintaining affordable housing to accommodate a range of income groups can assure that middle skill workers and seniors are not pushed out of the market.

Requiring that retail be a component of every project is a pitfall that should be avoided. Transit access can bolster the retail market, but the market must be viable without the transit component. Retail does not drive development around transit, it follows rooftops. Having an existing market for retail is fundamental to the success of retail development. Adding residential and office space to the mix can then bolster retail demand. The bottom line for any HCT system to be cost effective, is high concentrations of people and jobs within proximity to the station in order to generate passenger volumes.

TRANSLATING PLANS INTO ACTION

Creating transit oriented neighborhoods that can generate high ridership requires effective partnerships between public and private sector players. The expertise and resources of the private development community combined with the skills and assets of local government can be particularly effective in delivering a development project that meets the public goals. There are many national examples of collaboration which show how transit related projects are planned and developed. The role of the public sector has included a mix of tactics, including some of the following:

- Identify catalyst projects on publically owned land and create public/private partnerships to advance the endeavor.
- Facilitate land assembly to create large enough sites for transit related projects, and help rezone the parcel(s) if necessary.
- Obtain grants from the Federal Government to fund environmental remediation.
- Help with entitlement risk by reaching out to the community to gain consensus on a station area plan and provide coordination between stakeholders.
- Provide basic market analysis for projects near stations, including demographics, land ownership, etc.

[5] Bikes Belong

- Help with or make infrastructure investments, such as parks, sidewalk improvements, and transit stop enhancements to increase the curb appeal.
- Market the finished development.

Given limited financial and staff resources, local governments and transit planners need to be strategic when targeting and investing in station areas and corridors by providing policy and investment direction. Oregon Metro created a strategic plan which prioritizes the relative market strength and potential of the region's station areas and frequent bus corridors. They used a formula that measured the relative market strength which identified the likelihood of the station both supporting a transit lifestyle as well as catalyzing private investment in the short term. Understanding and defining the nature of projects that are appropriate for different types of stations allows private investment to respond to the characteristics of the site and identify its optimal uses.

LEVERAGING HCT TO FOSTER ECONOMIC DEVELOPMENT

Within the Grand Avenue corridor are existing employment clusters that range from anchor institutions, such as healthcare and education to construction and industrial uses. Site location factors vary by industry but often include access and proximity to customers, workforce and transportation. Clusters drive economic vitality, generating jobs and wages for residents and expanding purchases of products and services from local suppliers, all resulting in a positive ripple effect to create benefits for every community within a region.

Like many regions of the country, a focus on key industry clusters has been the approach of local economic development professionals. Throughout the U.S., employers in major markets have successfully leveraged their location within proximity to HCT to take advantage of the commute shed of a broader labor pool and attract skilled workers. Within the Phoenix metropolitan area the highest concentration of workers per acre is downtown Phoenix with more than 30 workers per acre. Overall, within the Grand Avenue corridor workers per acre range from 2 to 11. This variance is dependent upon whether the primary industry is office and government employment, which has higher employment densities; or industry employment, which has lower densities. While the Grand Avenue corridor does not have existing job densities that have been determined as the most desirable for HCT, Grand Avenue is anticipated to experience a 41 percent increase in population and a 52 percent increase in employment growth by 2030.

Research and case studies conducted by CTOD have concluded that walkability and transit orientation can be a catalyst for economic development and job creation. Data has shown that locations near transit have become increasingly attractive to employers. However, this does not apply to all sectors, since some jobs are more transit oriented than others. For example, manufacturing and warehousing don't employ the concentrations of people that would promote high ridership. On the other hand, office, colleges and universities, healthcare and hotels are very well suited for locations near transit.

STUDY CONCLUSIONS AND RECOMMENDATIONS

The ST LUIS evaluation framework utilized on the nine transit stops concludes that out of nine station stops, four meet or exceed the 60 percent threshold in scoring, due primarily to the high percentage of low income and minority population, transit supported density, and households without a vehicle. These station stops include Thompson Ranch Road, 59th, 43rd, and 27th Avenues, and are suburban in nature with less than 15 persons per acre; which is considerably shy of high capacity oriented density of 45+ persons per acre.

Based on the methodology utilized in this analysis, the US-60/Grand Avenue corridor currently does not meet the minimum criteria to support HCT. High concentrations of people and employment within proximity to the station are needed to generate passenger volumes and maximize the benefit of public investment in HCT.

Laying the groundwork today by linking transportation planning with land use could change the economic dynamics along the Grand Avenue corridor and boost investment and job creation for the future. Strategies to consider include:

- **Land use design** - Ensure walkability and pedestrian connectivity to foster place making and attract residents. The goal is to build a "place," not just a "project." The ideal mix of land uses includes residential (with a variety of price points), employment, retail and entertainment.
- **Supportive public policy** - Leverage transit by allowing density bonuses and reduced parking requirements to promote walkability and entice private development.
- **Transit feeder system** - Create transit hubs that facilitate transfers to commercial centers connecting people to work, shopping and services. Serve as origin and destination for commuters connecting to the regional network and include a mix of transit options such as regional rail and bus, BRT and local bus.
- **Public-private partnerships** - Form partnerships and establish mutual expectations to ensure a successful outcome. Utilize the expertise of the public sector to resolve land assemblage issues, ease the entitlement process, and provide infrastructure and/or land. Take advantage of the private developer's understanding of the real estate market and their ability to attract capital and end users.

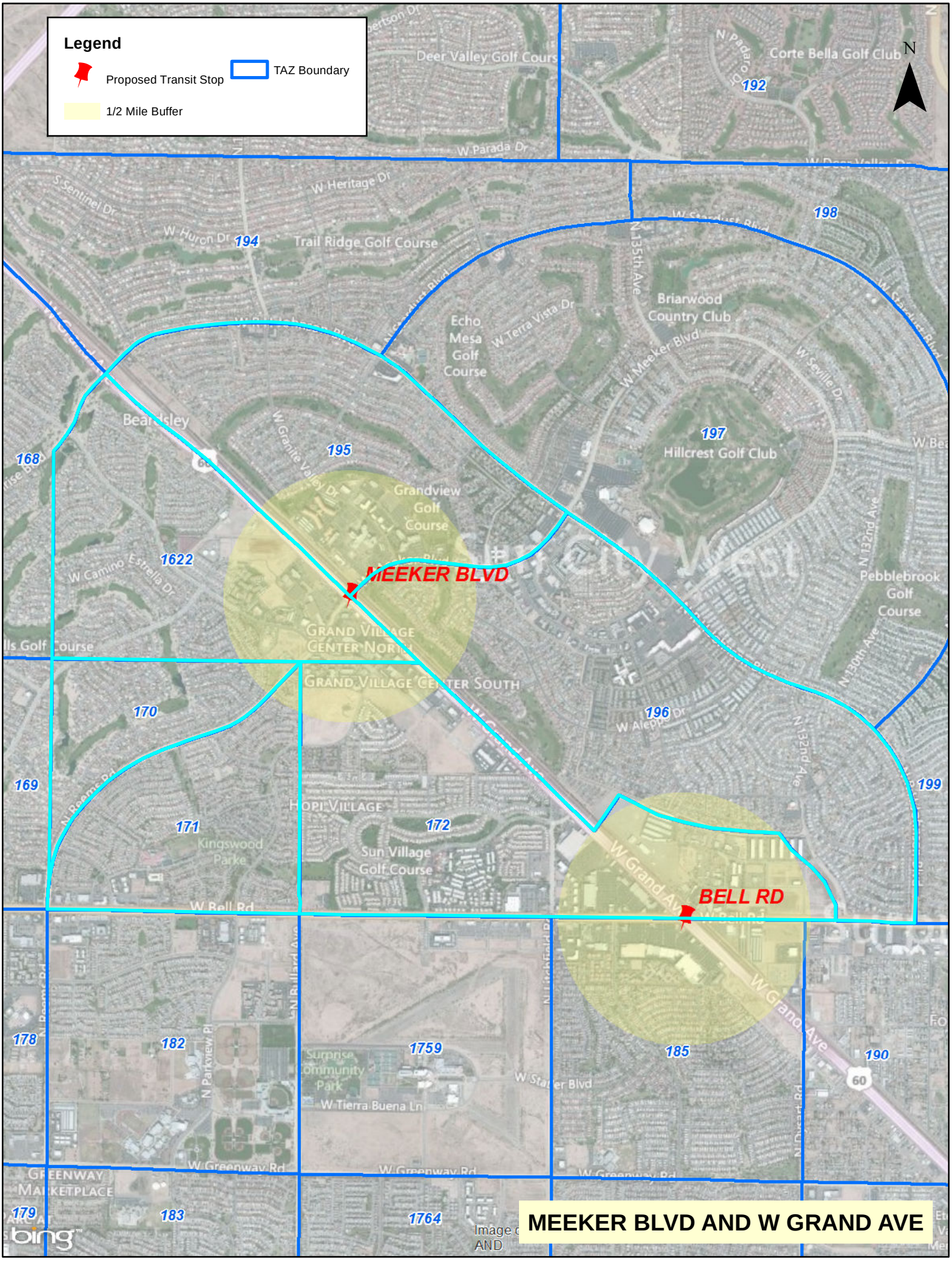
APPENDIX A – TRANSIT STOP SCORE BY CRITERIA

HCT Stops, Score by Criteria						
Corridor	Population		Employment		% Minority Pop	
	Score	Total Pop	Score	Total Emp	Score	%
Meeker Blvd	1	19,681	1	10,167	2	7
Bell Rd.	1	22,190	1	12,475	2	22
Thompson Ranch Rd.	1	23,549	1	7,817	8	58
103rd Ave.	1	7,487	1	5,296	2	6
83rd Ave.	3	38,926	2	14,279	6	42
59th Ave.	2	26,525	2	17,687	6	49
43rd Ave.	2	24,496	2	14,600	6	52
27th Ave.	2	24,496	2	14,600	10	64
19th Ave.	1	11,884	1	11,269	4	28
Corridor	% Low Income		Transit Supp. Density (Pop + Jobs/Acres)		Transit Supp. Job Density (Jobs/Acre)	
	Score	%	Score	Count	Score	Count
Meeker Blvd	8	24	4	6.3	8	2.1
Bell Rd.	10	30	4	7.6	6	1.8
Thompson Ranch Rd.	10	51	6	14.3	6	1.2
103rd Ave.	10	33	2	4.0	10	3.2
83rd Ave.	4	15	6	12.1	8	2.4
59th Ave.	10	41	6	12.2	6	1.2
43rd Ave.	10	30	4	11.0	8	2.2
27th Ave.	10	30	4	8.2	4	1.0
19th Ave.	10	40	4	8.9	6	1.3

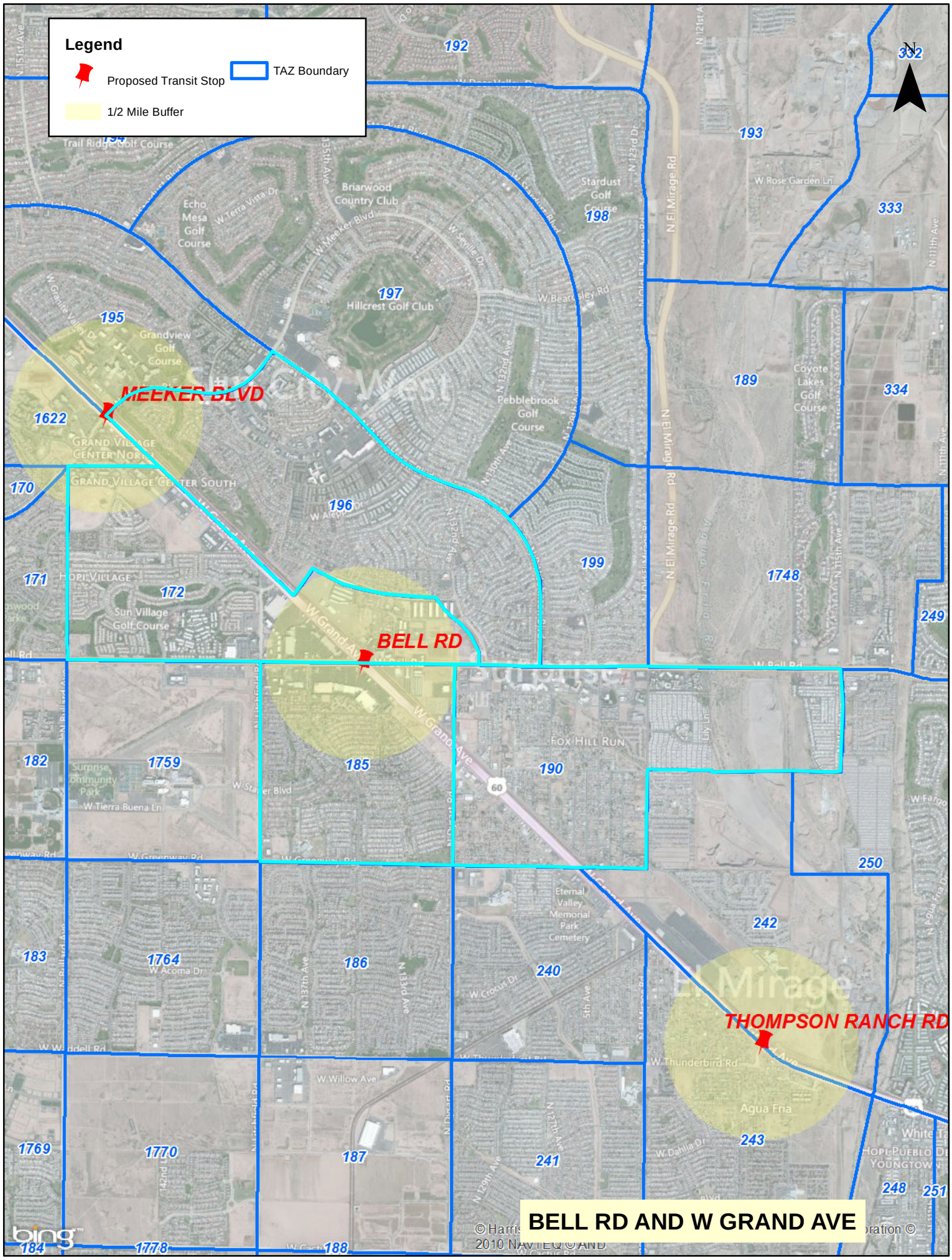
Source: MAG, U.S. Census 2010 Block Group Data

Notes: Some corridors may overlap geographically with others. Households in these overlapping areas are included in the totals for each corridor; transit -supportive jobs are defined as jobs in the government, entertainment and knowledge based sectors.

APPENDIX B – TRANSIT STOP BOUNDARY MAPS



MEEKER BLVD AND W GRAND AVE


Legend
Proposed Transit Stop
TAZ Boundary
1/2 Mile Buffer
MEEKER BLVD
BELL RD
THOMPSON RANCH RD
192
193
194
195
196
197
198
199
189
170
171
172
182
183
185
186
187
190
240
241
242
243
250
249
248
251
332
333
334
1622
1748
1759
1764
1769
1770
1778
184
188
Trail Ridge Golf Course
Echo Mesa Golf Course
Briarwood Country Club
Stardust Golf Course
Hillcrest Golf Club
Grandview Golf Course
Pebblebrook Golf Course
Coyote Lakes Golf Course
Sun Village Golf Course
Surprise Community Park
Eternal Valley Memorial Park Cemetery
Agua Fria
Fox Hill Run
Hopi Village
Grand Village Center South
W Meeker Blvd
W Grand Ave
N El Mirage Rd
W Bell Rd
W Thunderbird Rd
W Willow Ave
W Greenway Rd
W Waddell Rd
W Acoma Dr
W Crocus Dr
W Dahlia Dr
W Rose Garden Ln
W Tierra Buena Ln
W Starter Blvd
N 135th Ave
N 132nd Ave
N 130th Ave
N 137th Ave
N 133rd Ave
N 123rd Dr
N 121st Ave
N 115th Ave
N 111th Ave
N 151st Ave
N 129th Ave
N 127th Ave
5th Ave
60
bing
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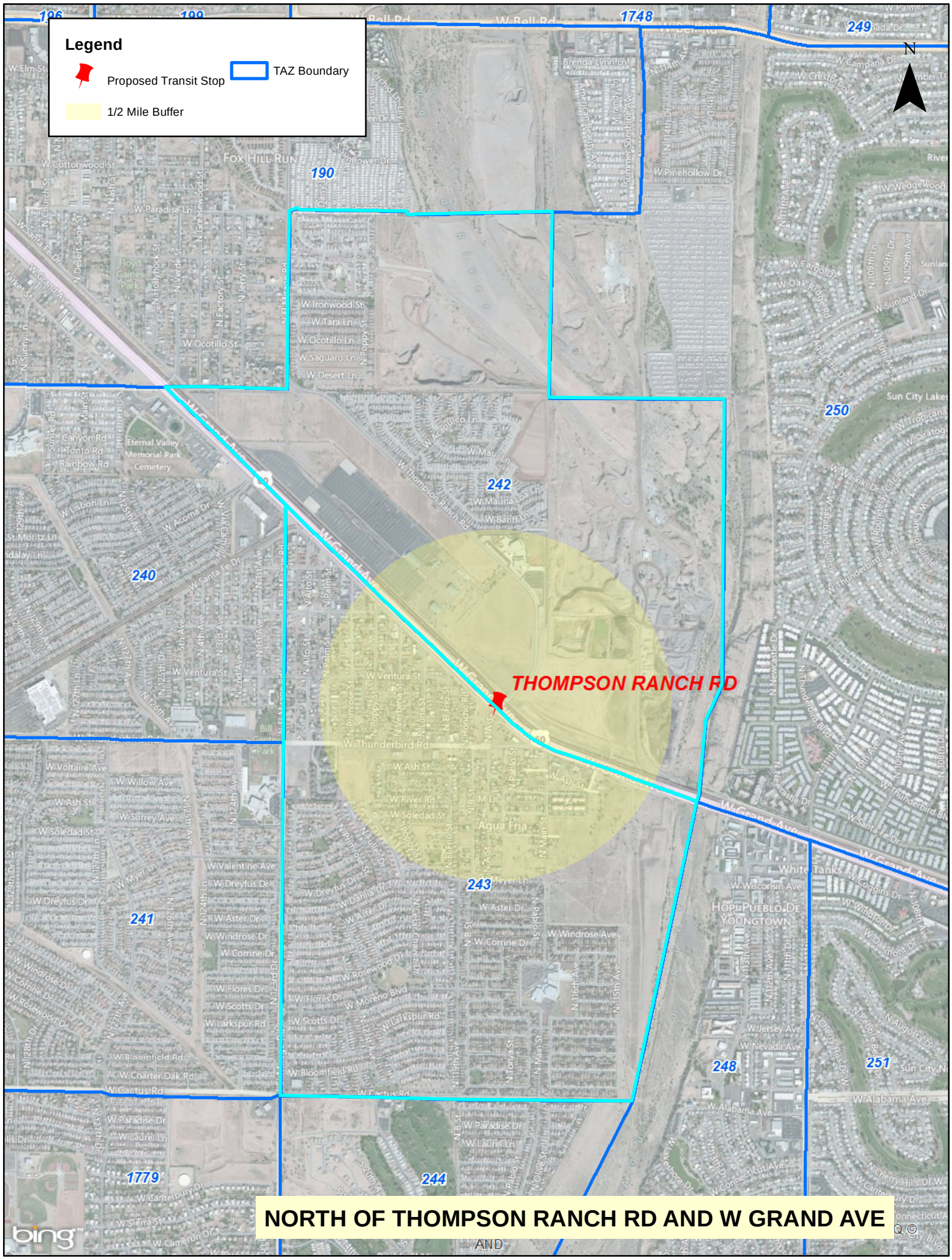
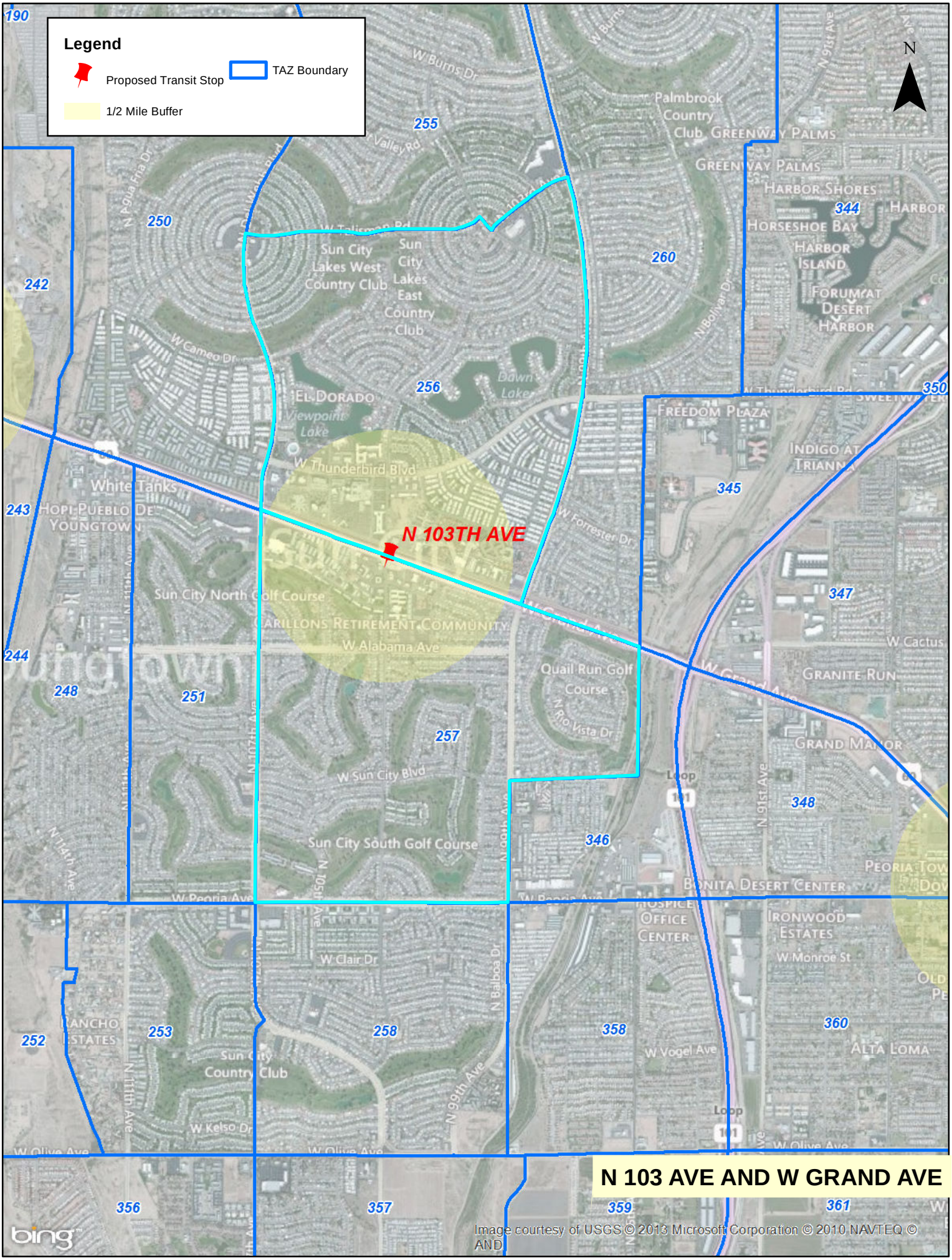
BELL RD AND W GRAND AVE



NORTH OF THOMPSON RANCH RD AND W GRAND AVE


Legend
Proposed Transit Stop
TAZ Boundary
1/2 Mile Buffer
N
N 103TH AVE
N 103 AVE AND W GRAND AVE
W Burns Dr
Palmbrook Country Club
GREENWAY PALMS
HARBOR SHORES
HORSESHOE BAY
HARBOR ISLAND
FORUM AT DESERT HARBOR
Sun City Lakes West Country Club
Sun City Lakes East Country Club
W Cameo Dr
EL DORADO
Viewpoint Lake
Dawn Lake
W Thunderbird Blvd
FREEDOM PLAZA
INDIGO AT TRIANNA
White Tanks
HOPI-PUEBLO DE YOUNGTOWN
W Forrester Dr
Sun City North Golf Course
CARILLONS RETIREMENT COMMUNITY
W Alabama Ave
Quail Run Golf Course
N Rio Vista Dr
GRANITE RUN
GRAND MANOR
W Cactus
W Sun City Blvd
Sun City South Golf Course
N 91st Ave
Loop 101
BONITA DESERT CENTER
HOSPICE OFFICE CENTER
IRONWOOD ESTATES
W Monroe St
W Clair Dr
N Bajoa Dr
RANCHO ESTATES
Sun City Country Club
W Vogel Ave
ALTA LOMA
W Kelso Dr
W Olive Ave
N 99th Ave
N 111th Ave
N 114th Ave
W Peoria Ave
255
250
242
243
244
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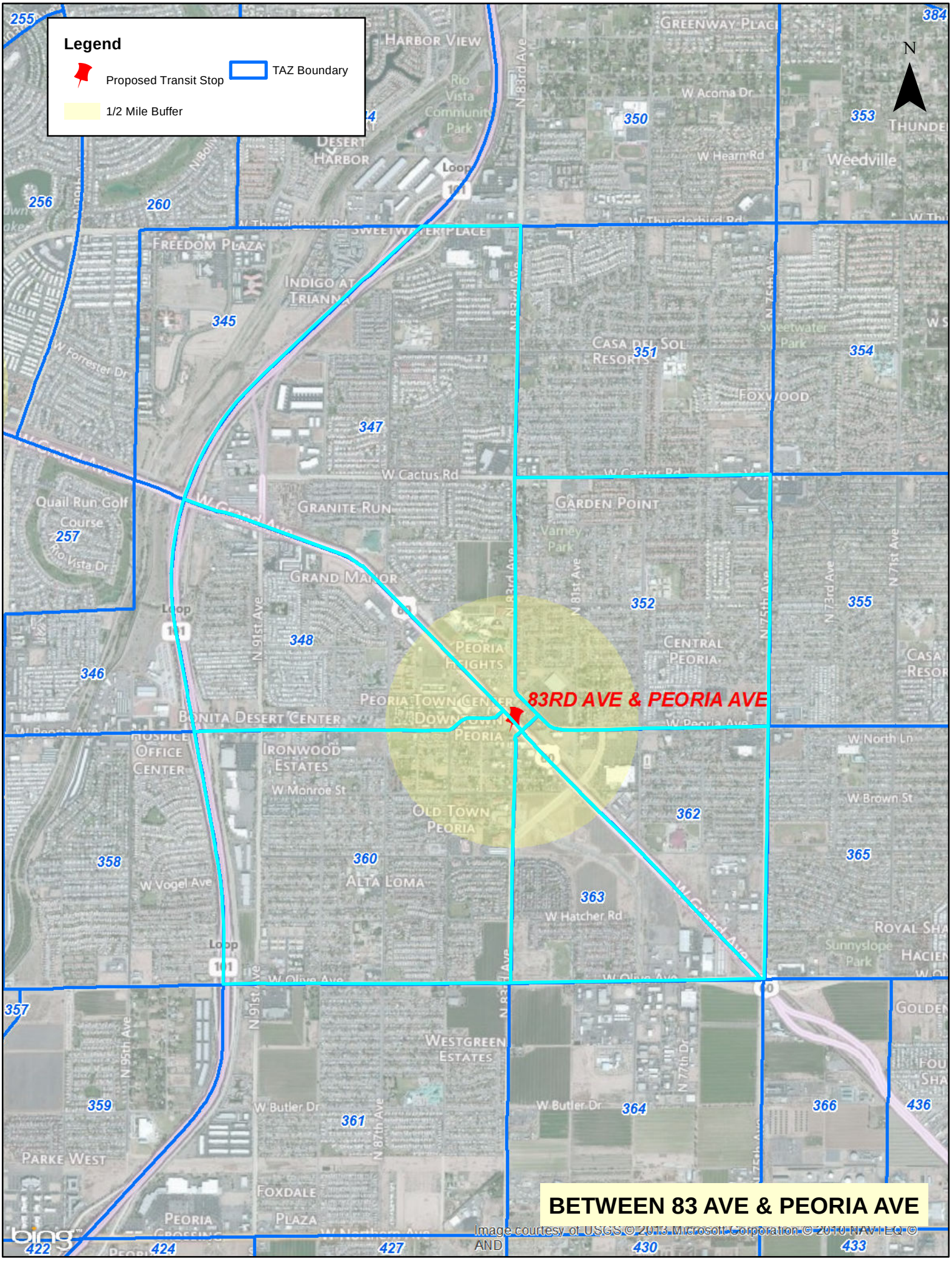
Legend
Proposed Transit Stop
TAZ Boundary
1/2 Mile Buffer
N
83RD AVE & PEORIA AVE
BETWEEN 83 AVE & PEORIA AVE
AND
Harbor View
Greenway Plaz
Rio Vista Community Park
Desert Harbor
W Acoma Dr
W Hearn Rd
Weedville
Freedom Plaza
Indigo at Trianna
Sweetwater Place
Casa del Sol Resorts
Foxwood
W Cactus Rd
Granite Run
Garden Point
Varney Park
Quail Run Golf Course
Rio Vista Dr
Grand Manor
Peoria Heights
Central Peoria
Peoria Town Center
Downtown Peoria
Bonita Desert Center
Hospice Office Center
Ironwood Estates
W Monroe St
Old Town Peoria
Alta Loma
W Vogel Ave
W Hatcher Rd
W North Ln
W Brown St
Sunnyslope Park
Westgreen Estates
W Butler Dr
Parke West
Foxdale Plaza
Peoria Crossing
Image courtesy of USGS © 2013 Microsoft Corporation © 2010 NAVTEQ ©
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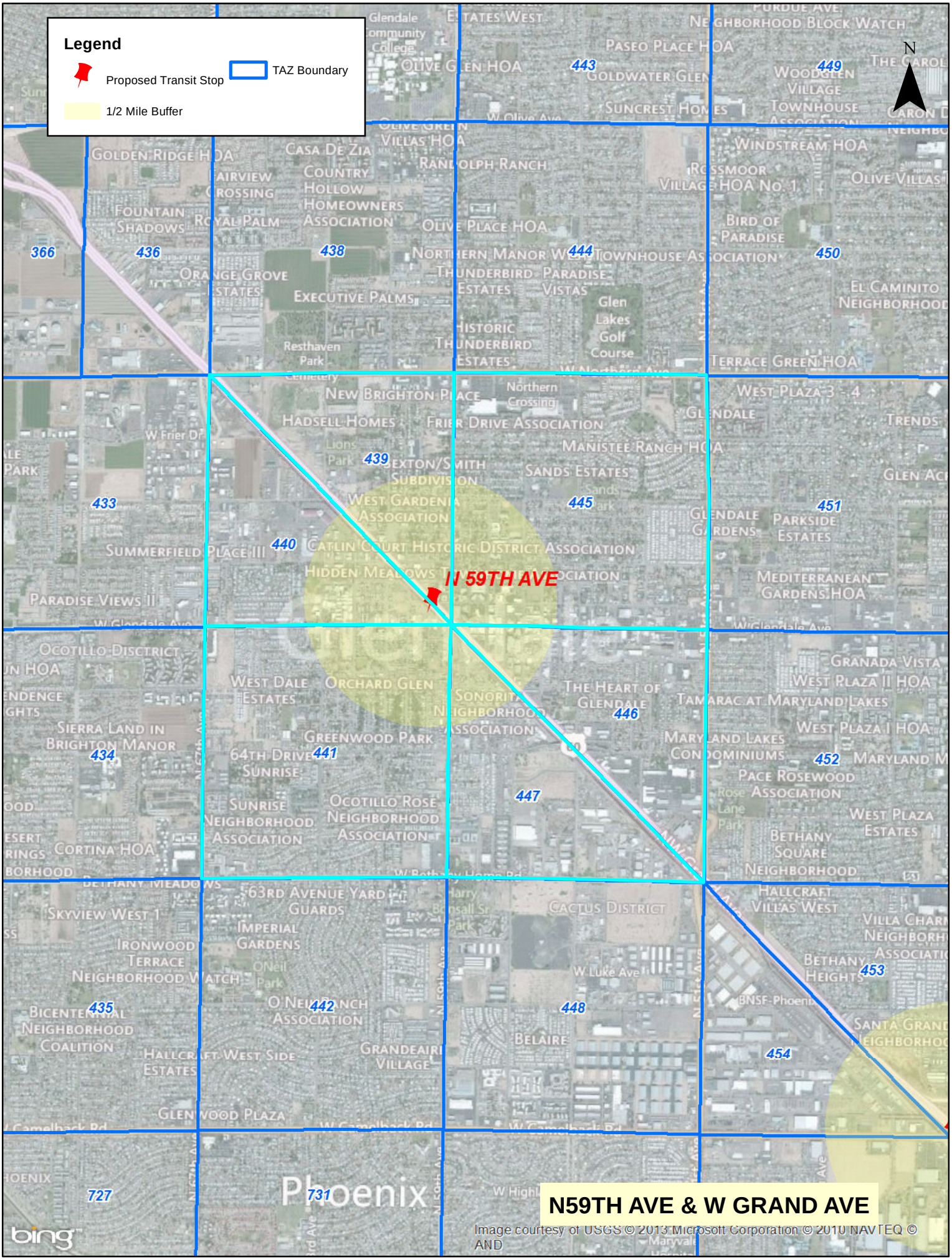
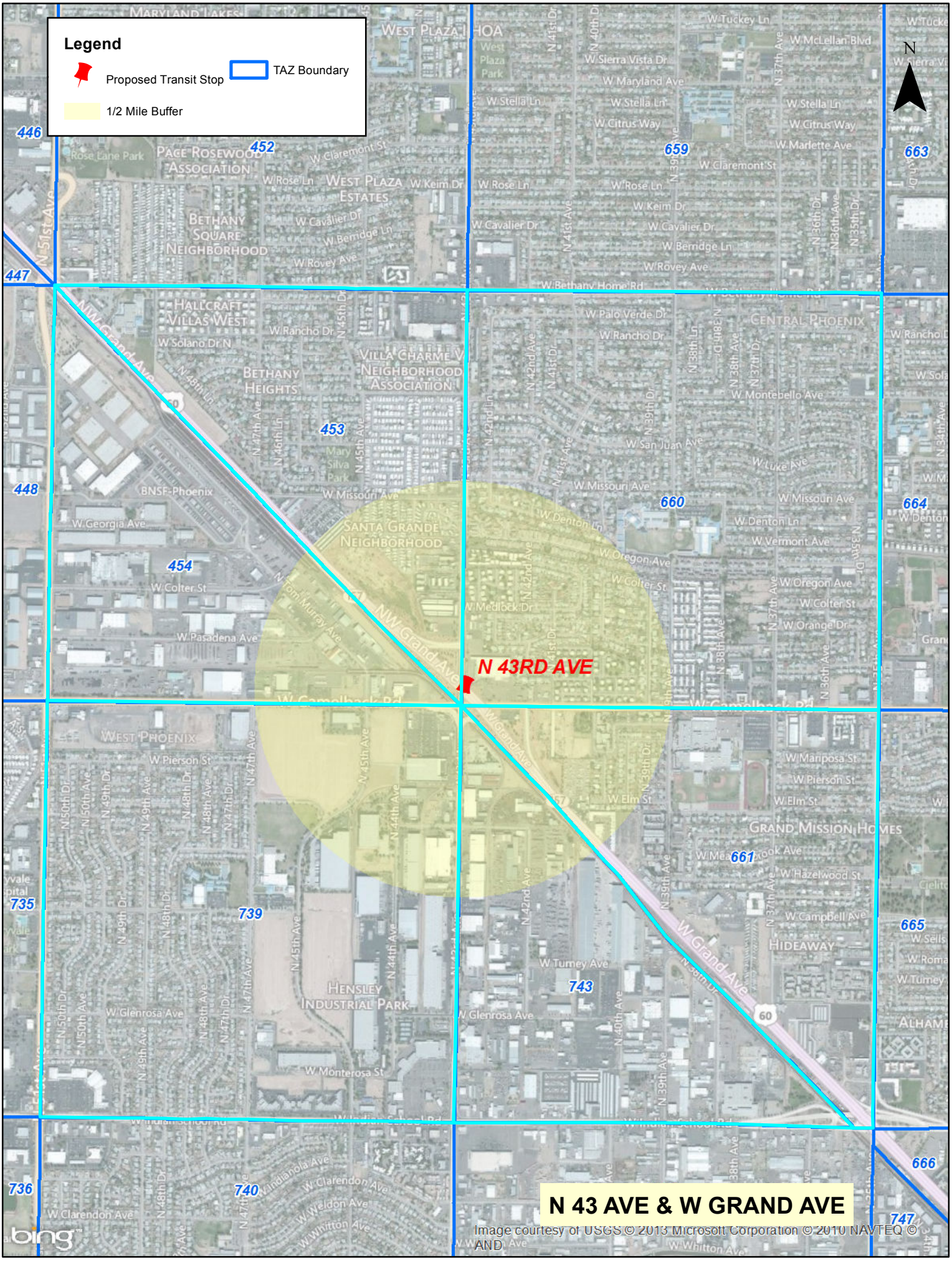
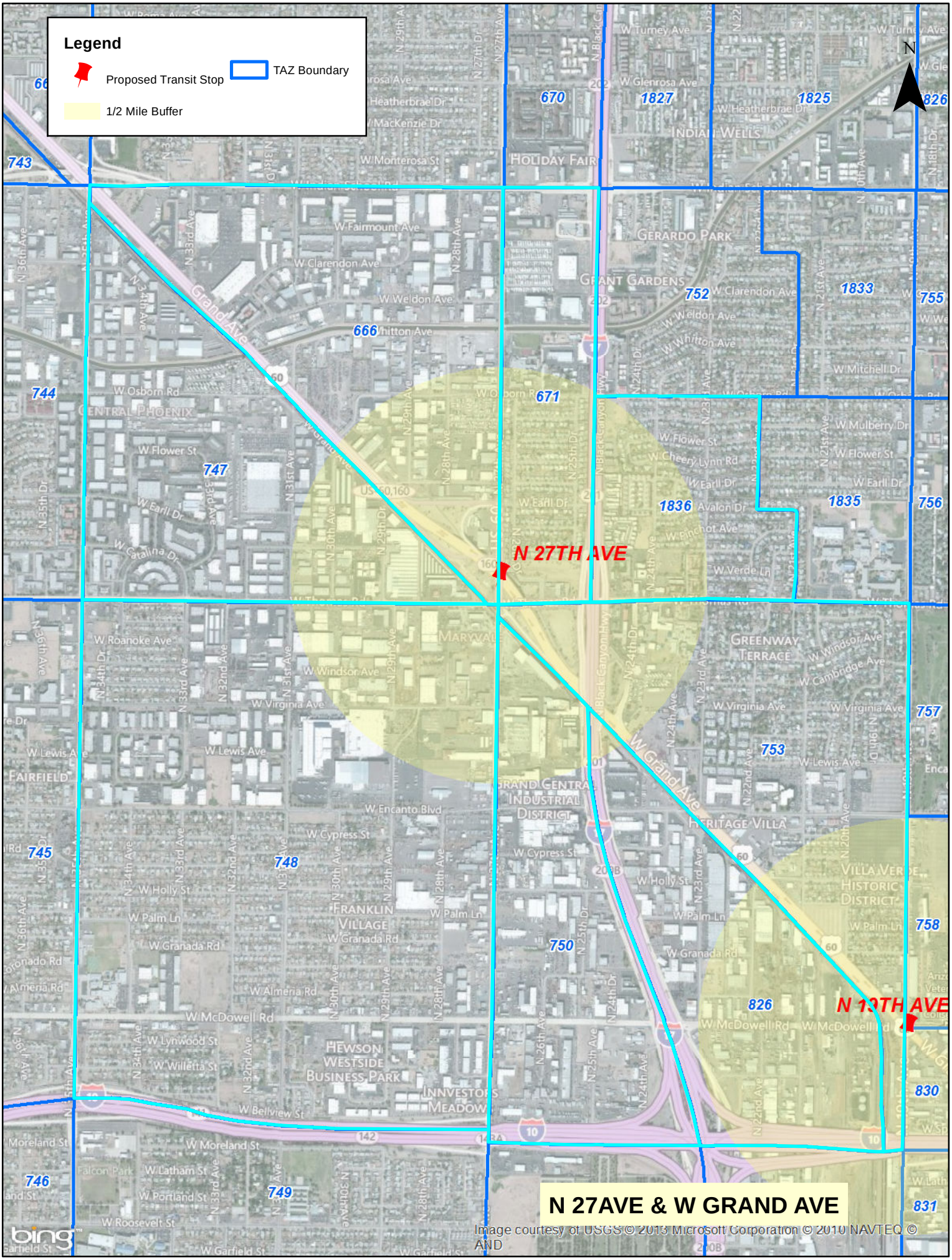
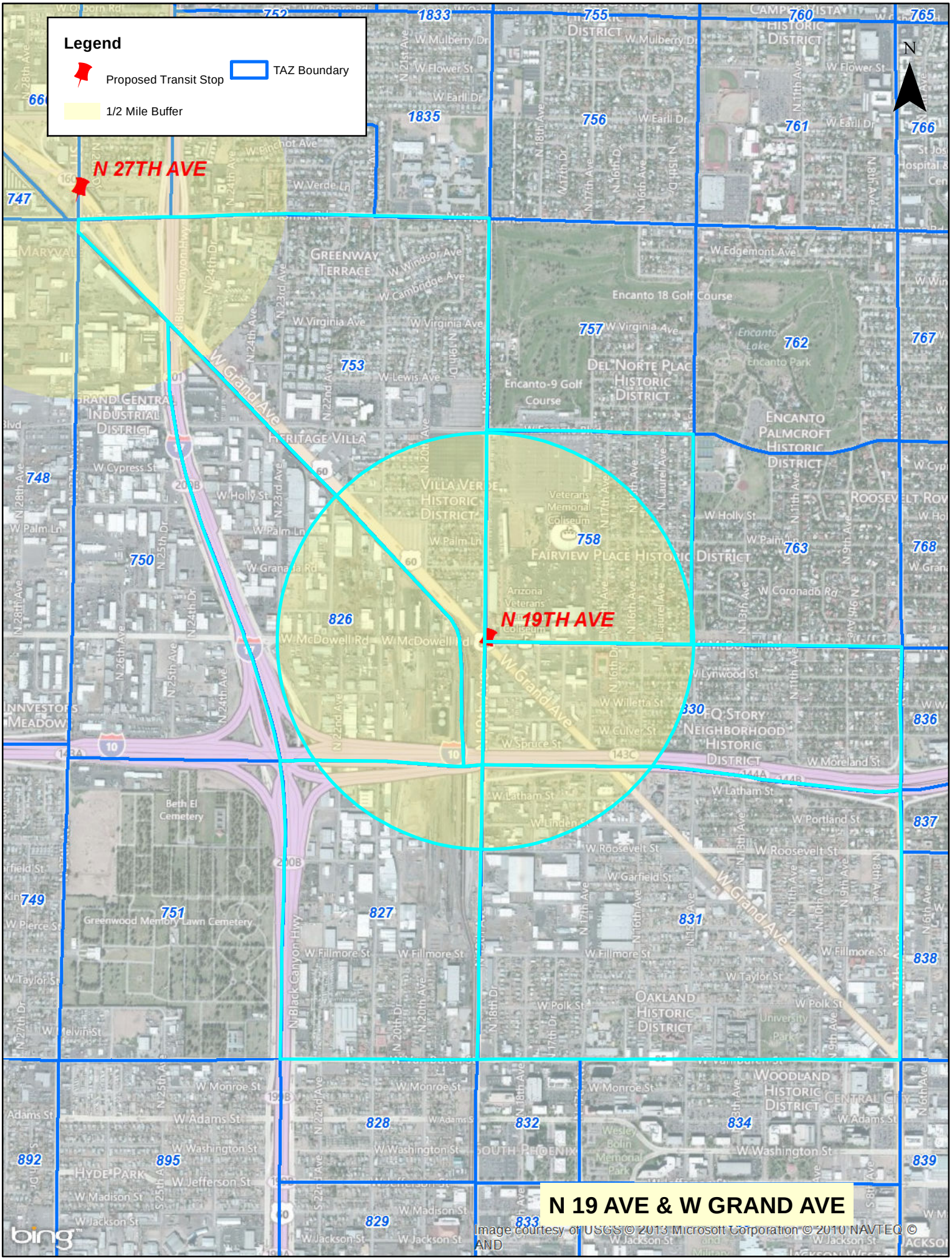

Legend
Proposed Transit Stop
TAZ Boundary
1/2 Mile Buffer
N
N 59TH AVE
366
436
438
443
444
449
450
433
439
440
445
451
434
441
446
452
447
435
442
448
453
454
727
731
Phoenix
N59TH AVE & W GRAND AVE
Image courtesy of USGS © 2013 Microsoft Corporation © 2010 NAVTEQ © AND


Legend
Proposed Transit Stop
TAZ Boundary
1/2 Mile Buffer
N
N 43RD AVE
N 43 AVE & W GRAND AVE
446
447
448
452
453
454
659
660
661
663
664
665
666
735
736
739
740
743
747
W Grand Ave
NW Grand Ave
W Camelback Rd
Santa Grande Neighborhood
Hensley Industrial Park
Page Rosewood Association
West Plaza Estates
Bethany Square Neighborhood
Hallcraft Villas West
Bethany Heights
Villa Charme Neighborhood Association
Central Phoenix
West Phoenix
Grand Mission Homes
Hideaway
BNSF-Phoenix
Image courtesy of USGS © 2013 Microsoft Corporation © 2010 NAVTEQ © AND


Legend
Proposed Transit Stop
TAZ Boundary
1/2 Mile Buffer
N
N 27TH AVE
N 13TH AVE
N 27AVE & W GRAND AVE
Image courtesy of USGS © 2013 Microsoft Corporation © 2010 NAVTEQ © AND
bing
Grand Ave
W Grand Ave
Holiday Fair
Indian Wells
Gerardo Park
Grant Gardens
Central Phoenix
Maryvale
Greenway Terrace
Fairfield
Grand Central Industrial District
Heritage Villa
Villa Verde Historic District
Franklin Village
Hewson Westside Business Park
Investors Meadow
W Turney Ave
W Glenrosa Ave
W Heatherbrae Dr
W Monterosa St
W Fairmount Ave
W Clarendon Ave
W Weldon Ave
W Whitton Ave
W Mitchell Dr
W Osborn Rd
W Flower St
W Earll Dr
W Catalina Dr
W Mulberry Dr
W Cheery Lynn Rd
W Avalon Dr
W Pinchot Ave
W Verde Ln
W Roanoke Ave
W Windsor Ave
W Virginia Ave
W Cambridge Ave
W Lewis Ave
W Encanto Blvd
W Cypress St
W Holly St
W Palm Ln
W Granada Rd
W Almeria Rd
W McDowell Rd
W Lynwood St
W Willetta St
W Bellview St
W Moreland St
W Latham St
W Portland St
W Roosevelt St
W Garfield St
670
1827
1825
826
743
752
1833
755
666
671
744
747
1836
1835
756
757
753
745
748
750
758
826
830
746
749
831

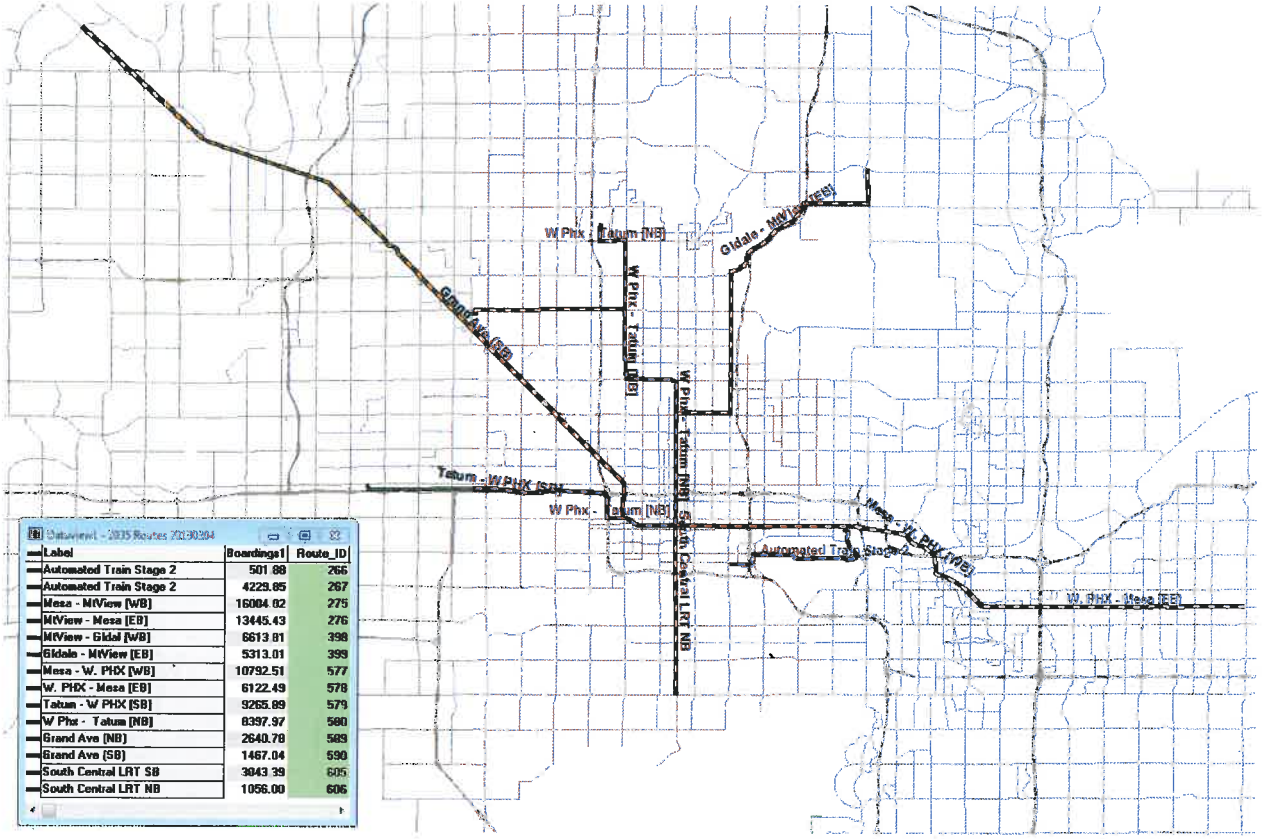


N 19 AVE & W GRAND AVE

APPENDIX TM5-6

MAG HCT 2035 Model Results and Valley Metro Ridership Report

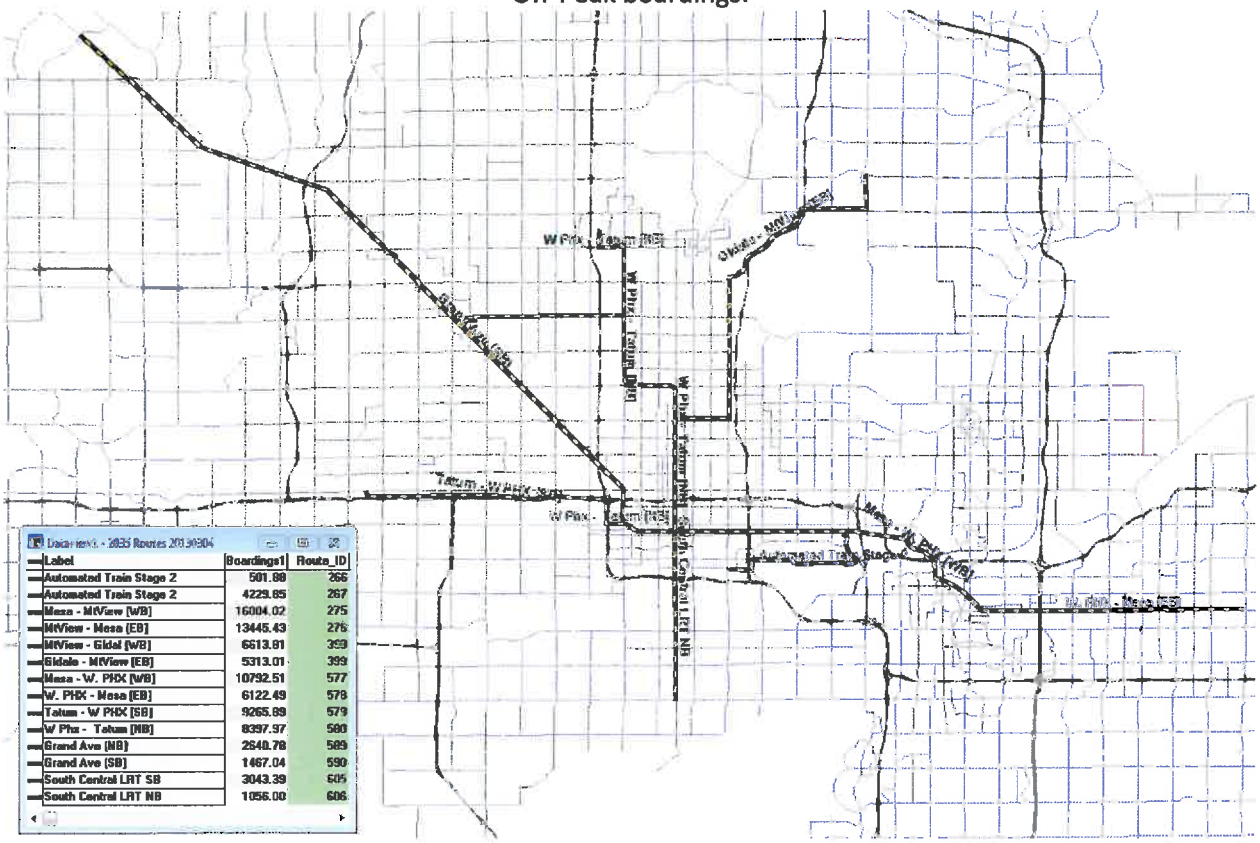
Peak boardings:



Dataview1 - 2035 Routes 20130204

Label	Boardings1	Route_ID
Automated Train Stage 2	501.88	266
Automated Train Stage 2	4229.85	267
Mesa - MtView [WB]	16004.02	275
MtView - Mesa [EB]	13445.43	276
MtView - Gldal [WB]	6613.81	398
Gldale - MtView [EB]	5313.01	399
Mesa - W. PHX [WB]	10792.51	577
W. PHX - Mesa [EB]	6122.49	578
Tatum - W PHX [SB]	9265.89	579
W Phx - Tatum [NB]	8397.97	580
Grand Ave [NB]	2640.78	589
Grand Ave [SB]	1467.04	590
South Central LRT SB	3043.39	605
South Central LRT NB	1056.00	606

Off-Peak boardings:

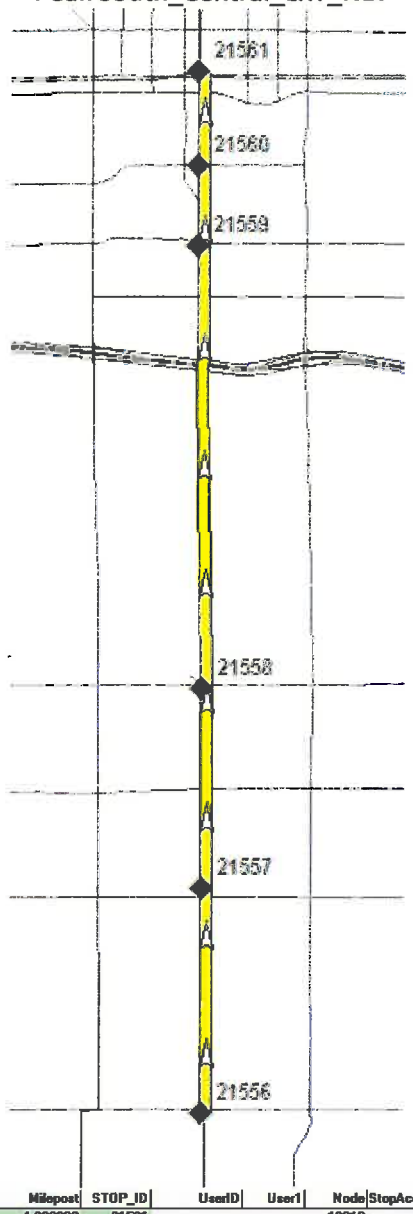


Documents - 2035 Routes 20130304

Label	Boardings1	Route_ID
Automated Train Stage 2	501.89	266
Automated Train Stage 2	4229.85	267
Mesa - MtView [WB]	16004.02	275
MtView - Mesa [EB]	13445.43	276
MtView - Gilbert [WB]	6613.81	399
Gilbert - MtView [EB]	5313.01	399
Mesa - W. PHX [WB]	10792.51	577
W. PHX - Mesa [EB]	6122.49	578
Tatum - W PHX [SB]	9265.89	579
W Phx - Tatum [NB]	8397.97	580
Grand Ave [NB]	2640.78	589
Grand Ave [SB]	1467.04	590
South Central LRT SB	3043.39	605
South Central LRT NB	1056.00	606

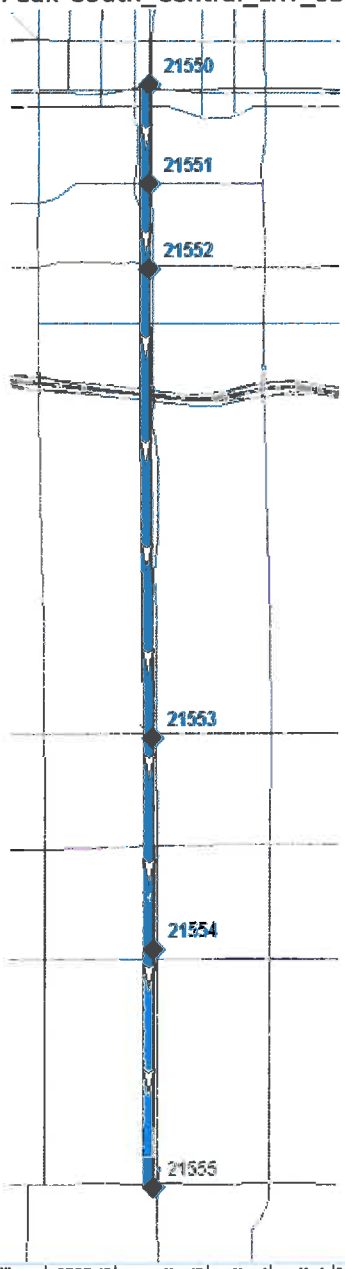
Route_ID	Route_Name	Route_ID0	Mode	Headway	Label	User1	User2	Boardings
266	AT-Stage 2 WB	230	9	3.00	Automated Train Stage 2	0.00	0.00	3324.72
267	AT-Stage 2 EB	231	9	3.00	Automated Train Stage 2	0.00	0.00	614.46
275	BE1	373	9	12.00	Mesa - MtView [WB]	0.00	0.00	10880.62
276	BE2	374	9	12.00	MtView - Mesa [EB]	0.00	0.00	10968.45
398	DE1	226	9	12.00	MtView - Gidal [WB]	0.00	0.00	3339.17
399	DE2	227	9	12.00	Gidale - MtView [EB]	0.00	0.00	4968.52
575	AC1	375	9	12.00	Mesa - W. PHX [WB]	0.00	0.00	6487.52
576	AC2	376	9	12.00	W. PHX - Mesa [EB]	0.00	0.00	7231.71
577	AF1	271	9	12.00	Tatum - W PHX [SB]	0.00	0.00	6645.47
578	AF2	272	9	12.00	W Phx - Tatum [NB]	0.00	0.00	6788.61
594	Grand_Ave_LRT_NB	--	9	12.00	Grand Avenue LRT NB	--	--	730.41
595	Grand_Ave_LRT_SB	--	9	12.00	Grand Avenue LRT SB	--	--	1284.84
596	South_Central_LRT_SB	--	9	12.00	South Central LRT SB	--	--	496.83
597	South_Central_LRT_NB	--	9	12.00	South Central LRT NB	--	--	1503.79

Peak South_Central_LRT_NB:



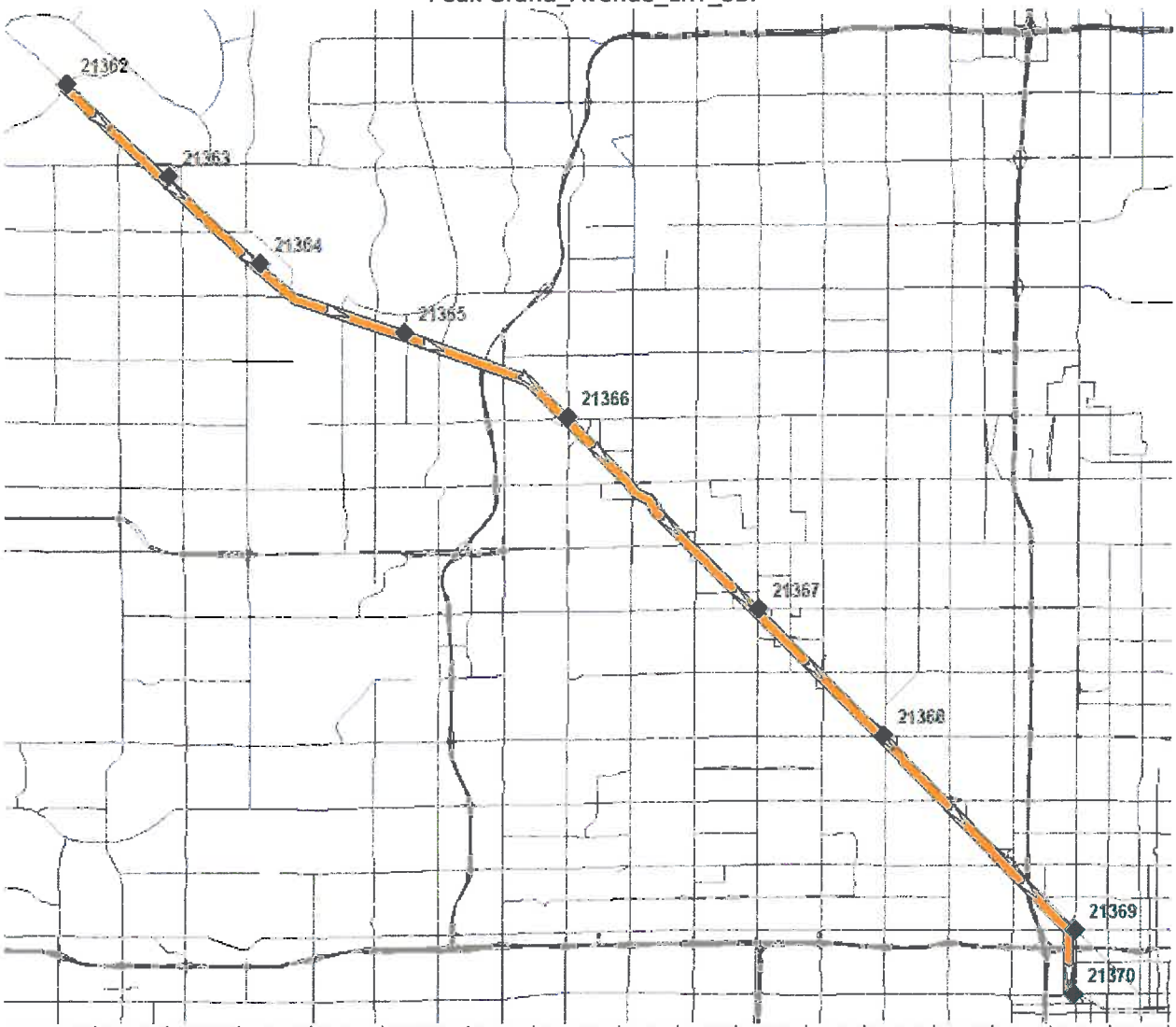
ID	Longitude	Latitude	Route_ID	Pass_Count	Milepost	STOP_ID	UserID	User1	Node	StopAccess	StopFlag	StopTypeID	NodeID	mode	Boardings	Alightings
21561	-112073919	33448471	606	1	4.998683	21561	--	--	19018	0	1	1	19018	9	473	473
21560	-112073921	33442064	606	1	4.457128	21560	--	--	55710	0	1	1	55710	9	13	13
21559	-112073916	33436619	606	1	4.001872	21559	--	--	55711	0	1	1	55711	9	182	182
21558	-112073590	33406412	606	1	1.996118	21558	--	--	55712	0	1	1	55712	9	235	235
21557	-112073555	33392717	606	1	1.062236	21557	--	--	55714	0	1	1	55714	9	110	110
21556	-112073516	33377448	606	1	0.000000	21556	--	--	55713	0	1	1	55713	9	40	40

Peak South_Central_LRT_SB:



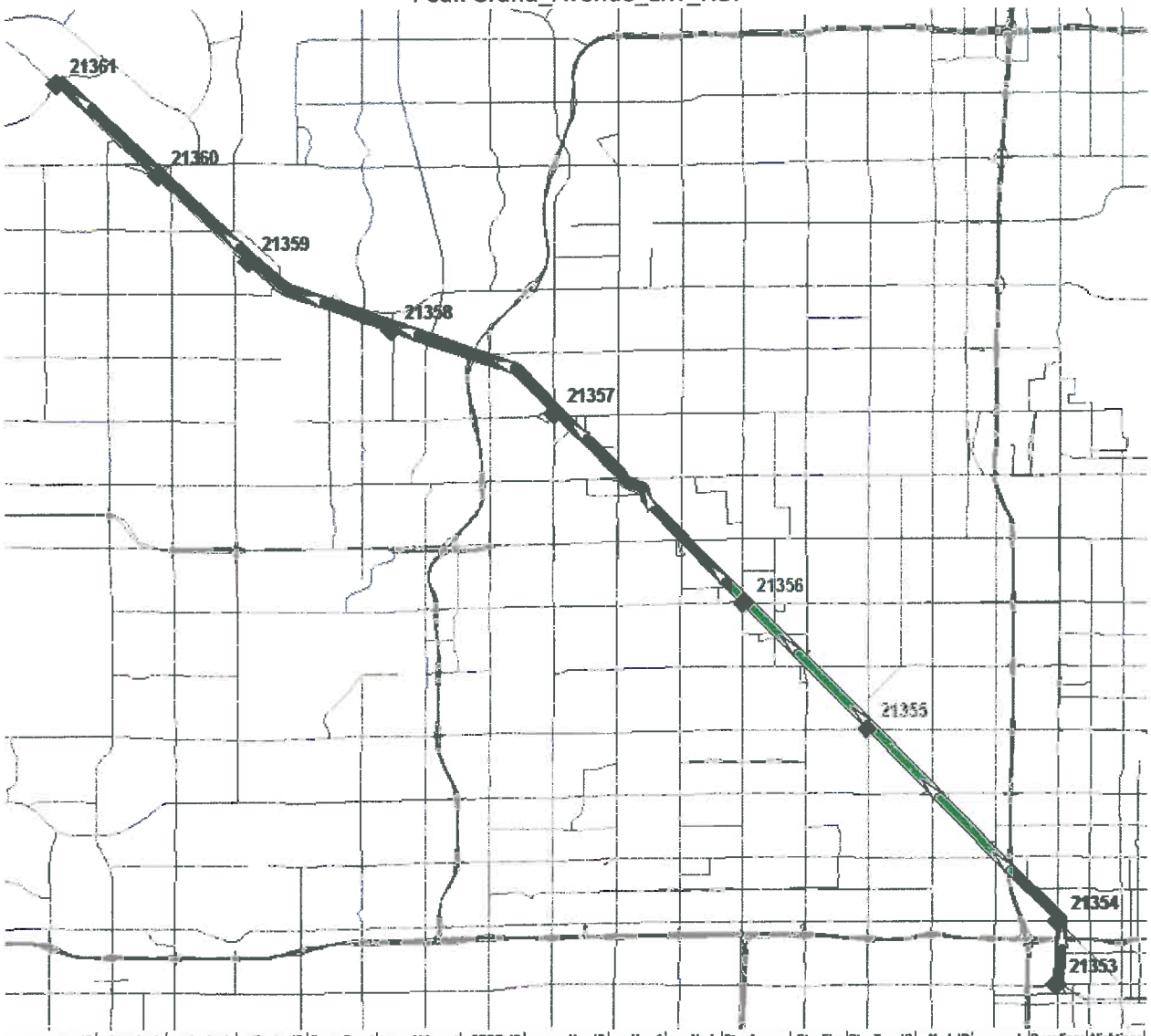
ID	Longitude	Latitude	Route_ID	Pass_Count	Milepost	STOP_ID	UserID	User1	Node	StopAccess	StopFlag	StopTypeID	NodeID	mode	Boardings	Alightings
21555	-112073516	33377440	605	1	4.090683	21555	--	--	55713	0	1	1	55713	9	202	202
21554	-112073555	33392717	605	1	3.046387	21554	--	--	55714	0	1	1	55714	9	565	565
21553	-112073590	33406412	605	1	2.902565	21553	--	--	55712	0	1	1	55712	9	588	588
21552	-112073916	33436619	605	1	0.816812	21552	--	--	55711	0	1	1	55711	9	382	382
21551	-112073921	33442064	605	1	0.441555	21551	--	--	55710	0	1	1	55710	9	65	65
21550	-112073919	33448471	605	1	0.000000	21550	--	--	19018	0	1	1	19018	9	1238	1238

Peak Grand_Avenue_LRT_SB:



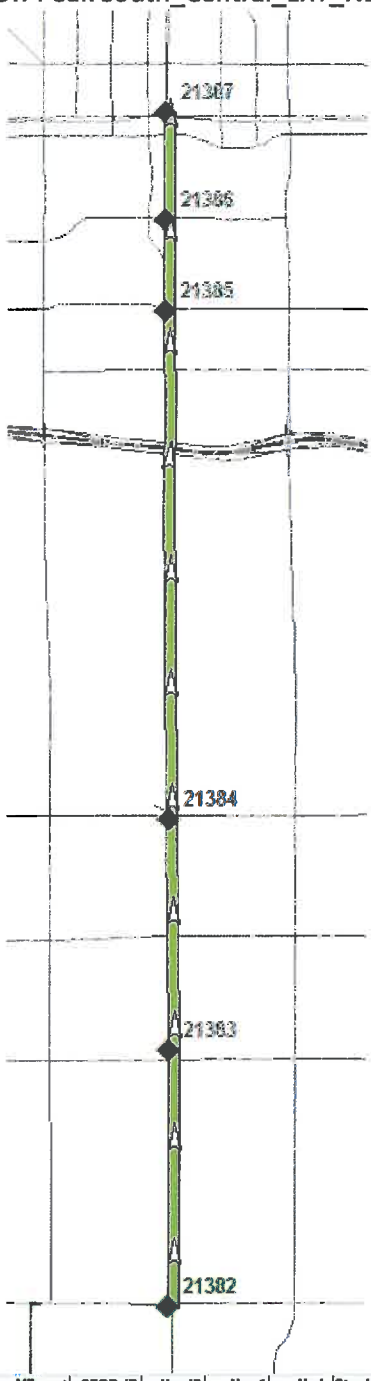
ID	Longitude	Latitude	Route_ID	Pass_Count	Milepost	STOP_ID	UserID	User1	Node	StopAccess	StopFlag	StopTypeID	NodeID	mode	Boardings	Alightings
21370	-112180406	33451038	590	1	21.806826	21370	--	--	55691	0	1	1	55691	9	3	3
21369	-112100131	33465724	590	1	20.894575	21369	--	--	55692	0	1	1	55692	9	121	121
21368	-112151936	33509569	590	1	16.642460	21368	--	--	55694	0	1	1	55694	9	130	130
21367	-112186024	33538173	590	1	13.857150	21367	--	--	55696	0	1	1	55696	9	156	156
21366	-112237529	33591572	590	1	9.590852	21366	--	--	55699	0	1	1	55699	9	189	189
21365	-112281618	33600509	590	1	6.668566	21365	--	--	55701	0	1	1	55701	9	81	81
21364	-112320897	33616146	590	1	4.117018	21364	--	--	55702	0	1	1	55702	9	162	162
21363	-112345577	33635745	590	1	2.150286	21363	--	--	55703	0	1	1	55703	9	449	449
21362	-112373106	33656800	590	1	0.000000	21362	--	--	55704	0	1	1	55704	9	170	170

Peak Grand_Avenue_LRT_NB:



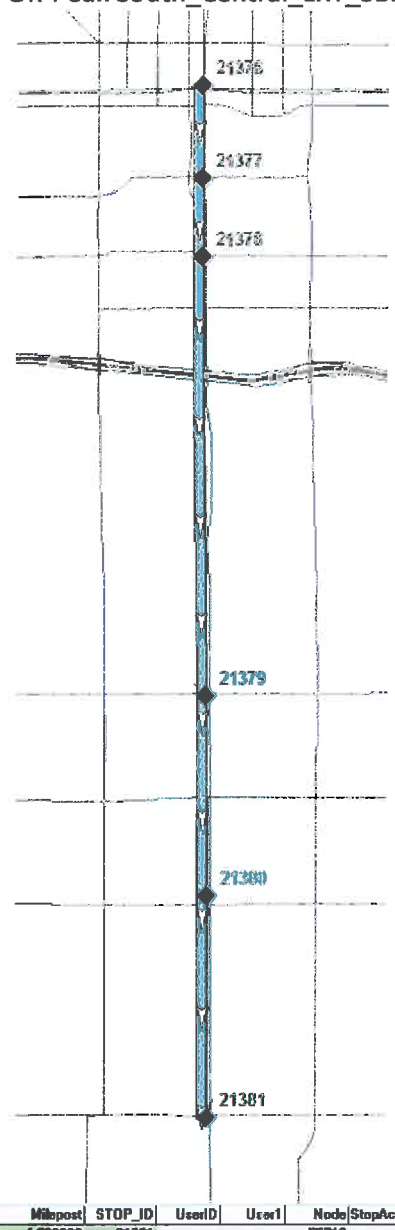
ID	Longitude	Latitude	Route_ID	Pass_Count	Milepost	STOP_ID	UserID	User1	Node	StopAccess	StopFlag	StopTypeID	NodeID	mode	Boardings	Alighings
21361	-112373106	33656800	589	1	21.908828	21361	--	--	55704	0	1	1	55704	9	472	472
21360	-112345577	33635745	589	1	19.756540	21360	--	--	55703	0	1	1	55703	9	660	660
21359	-112320897	33616146	589	1	17.789808	21359	--	--	55702	0	1	1	55702	9	169	169
21358	-112281618	33600509	589	1	15.238259	21358	--	--	55701	0	1	1	55701	9	145	145
21357	-112237529	33581572	589	1	12.315974	21357	--	--	55699	0	1	1	55699	9	364	364
21356	-112186024	33538173	589	1	8.049676	21356	--	--	55696	0	1	1	55696	9	355	355
21355	-112151936	33509569	589	1	5.264367	21355	--	--	55694	0	1	1	55694	9	205	205
21354	-112100131	33465724	589	1	1.012250	21354	--	--	55692	0	1	1	55692	9	265	265
21353	-112100405	33451838	589	1	0.000000	21353	--	--	55691	0	1	1	55691	9	0	0

Off Peak South_Central_LRT_NB:



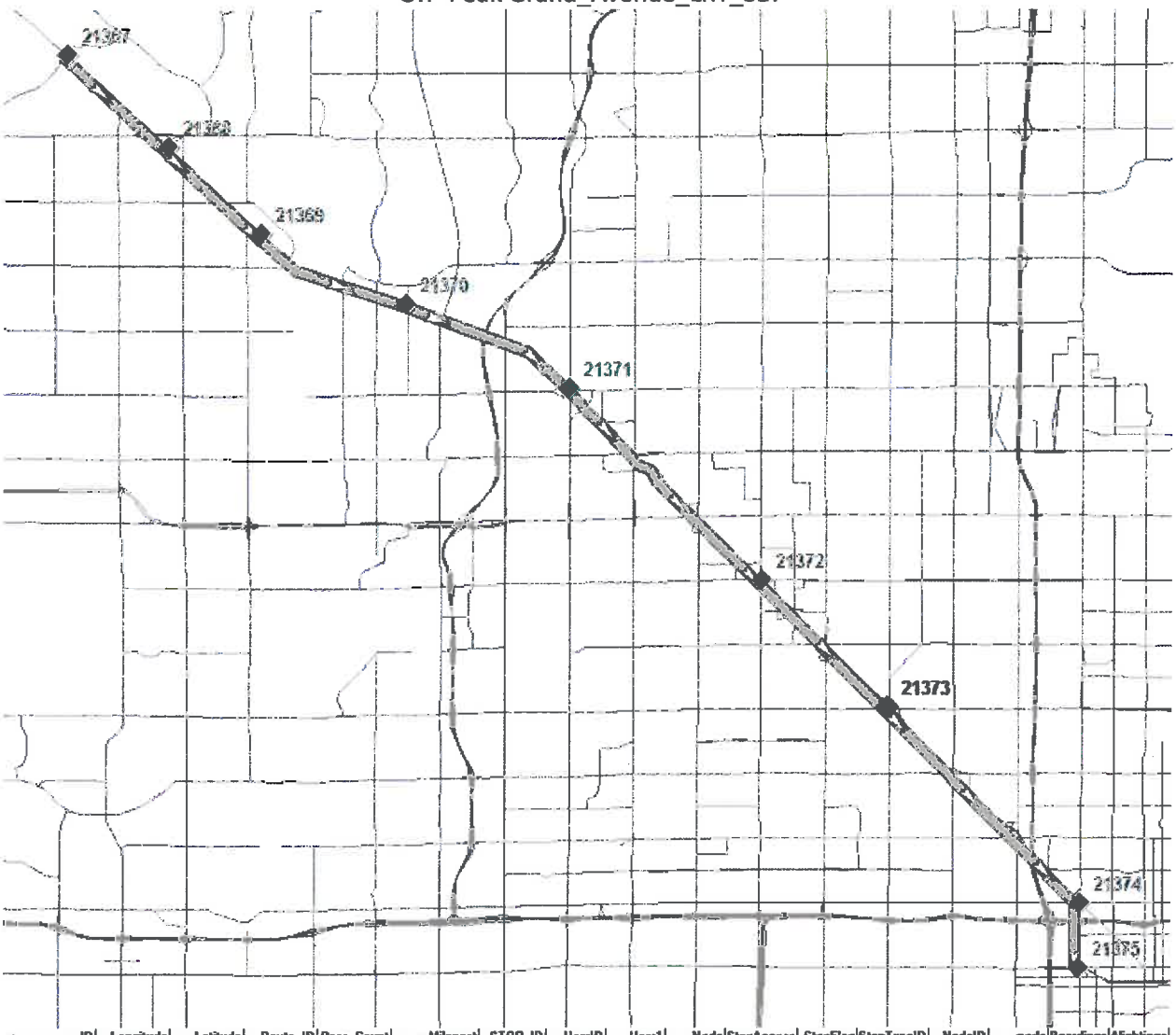
ID	Longitude	Latitude	Route_ID	Pass_Count	Milepost	STOP_ID	UserID	User1	Node	StopAccess	StopFlag	StopTypeID	NodeID	mode	Boardings	Alightings
21387	-112073919	33448471	597	1	4.099683	21387	--	--	19018	0	1	1	19018	9	680	680
21386	-112073921	33442064	597	1	4.457128	21386	--	--	55710	0	1	1	55710	9	17	17
21385	-112073916	33436519	597	1	4.081072	21385	--	--	55711	0	1	1	55711	9	152	152
21384	-112073590	33406412	597	1	1.996118	21384	--	--	55712	0	1	1	55712	9	336	336
21383	-112073555	33392717	597	1	1.052296	21383	--	--	55714	0	1	1	55714	9	169	169
21382	-112073516	33377448	597	1	0.000000	21382	--	--	55713	0	1	1	55713	9	146	146

Off Peak South_Central_LRT_SB:



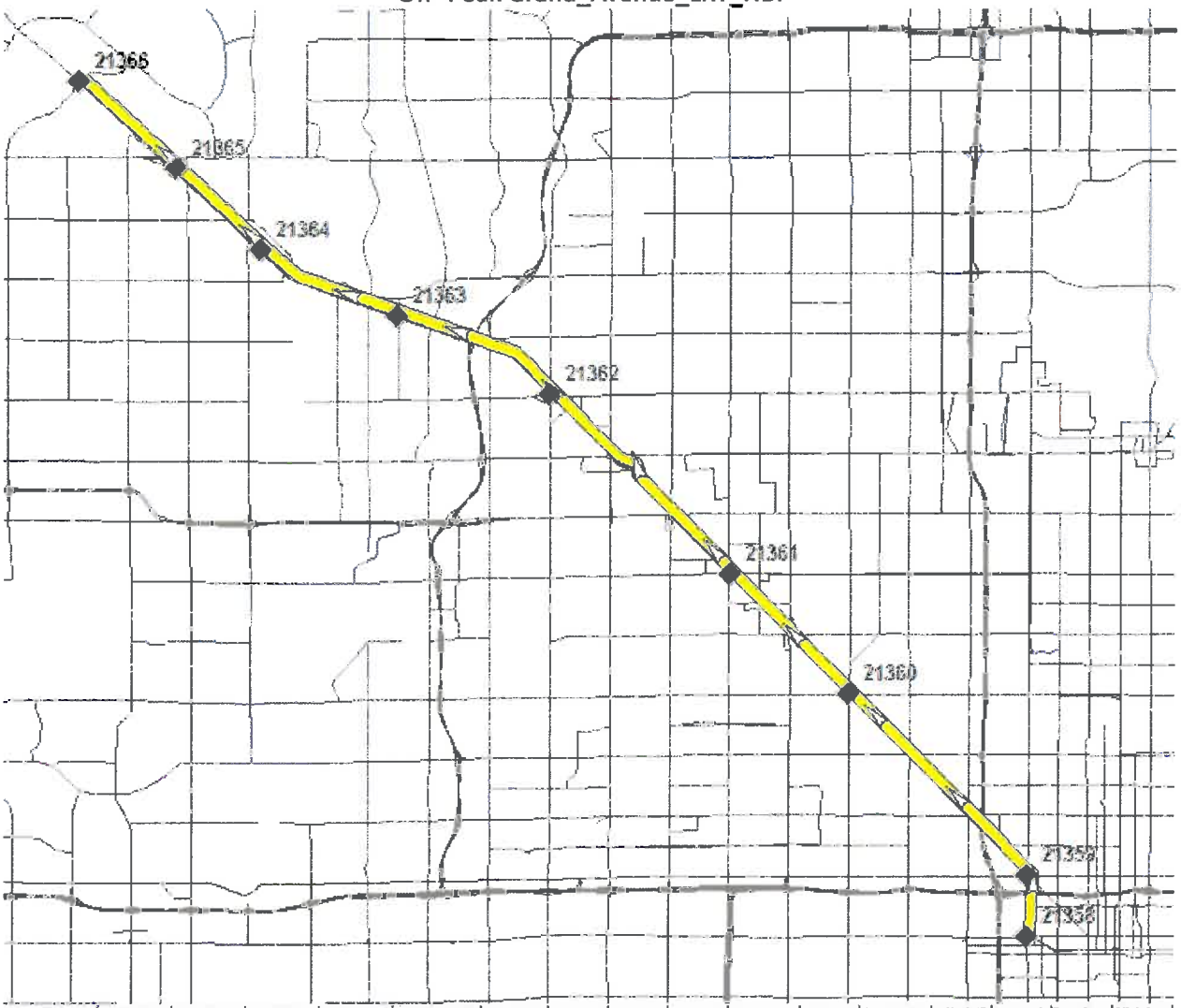
ID	Longitude	Latitude	Route_ID	Pass_Count	Milepost	STOP_ID	UserID	User1	Node	StopAccess	StopFlag	StopTypeID	NodeID	mode	Boardings	Alightings
21381	-112073516	33377449	596	1	1.898683	21381	--	--	55713	0	1	1	55713	9	22	22
21380	-112073555	33392717	596	1	3.846387	21380	--	--	55714	0	1	1	55714	9	39	39
21379	-112073590	33406412	596	1	2.902565	21379	--	--	55712	0	1	1	55712	9	98	98
21378	-112073916	33436619	596	1	0.816812	21378	--	--	55711	0	1	1	55711	9	94	94
21377	-112073921	33442064	596	1	0.441555	21377	--	--	55710	0	1	1	55710	9	15	15
21376	-112073919	33448471	596	1	0.000000	21376	--	--	19018	0	1	1	19018	9	225	225

Off- Peak Grand_Avenue_LRT_SB:



ID	Longitude	Latitude	Route_ID	Pass_Count	Milepost	STOP_ID	UserID	User1	Node	StopAccess	StopFlag	StopTypeID	NodeID	mode	Boardings	Alightings
21375	-112100405	33451038	595	1	21.906826	21375	--	--	55691	0	1	1	55691	9	0	0
21374	-112100131	33465724	595	1	20.094575	21374	--	--	55692	0	1	1	55692	9	122	122
21373	-112151936	33509569	595	1	16.642460	21373	--	--	55694	0	1	1	55694	9	116	116
21372	-112186024	33538173	595	1	13.057150	21372	--	--	55696	0	1	1	55696	9	188	188
21371	-112237529	33581572	595	1	9.590852	21371	--	--	55699	0	1	1	55699	9	184	184
21370	-112281618	33600509	595	1	6.668566	21370	--	--	55701	0	1	1	55701	9	115	115
21369	-112320897	33616146	595	1	4.117018	21369	--	--	55702	0	1	1	55702	9	106	106
21368	-112345577	33635745	595	1	2.150286	21368	--	--	55703	0	1	1	55703	9	278	278
21367	-112373106	33656800	595	1	0.000000	21367	--	--	55704	0	1	1	55704	9	171	171

Off- Peak Grand_Avenue_LRT_NB:



ID	Longitude	Latitude	Route_ID	Pass_Count	Milepost	STOP_ID	UserID	User1	Node	StopAccess	StopFlag	StopTypeID	NodeID	mode	Boardings	Alightings
21366	-112373106	33656900	594	1	21.906826	21366	--	--	55704	0	1	1	55704	9	92	92
21365	-112345577	33635745	594	1	19.756540	21365	--	--	55703	0	1	1	55703	9	179	179
21364	-112320897	33616146	594	1	17.789808	21364	--	--	55702	0	1	1	55702	9	40	40
21363	-112281618	33600509	594	1	15.238259	21363	--	--	55701	0	1	1	55701	9	72	72
21362	-112237529	33581572	594	1	12.315974	21362	--	--	55699	0	1	1	55699	9	110	110
21361	-112186024	33538173	594	1	8.049676	21361	--	--	55696	0	1	1	55696	9	98	98
21360	-112151936	33509569	594	1	5.264367	21360	--	--	55694	0	1	1	55694	9	88	88
21359	-112100131	33465724	594	1	1.012250	21359	--	--	55692	0	1	1	55692	9	47	47
21358	-112100405	33451038	594	1	0.000000	21358	--	--	55691	0	1	1	55691	9	0	0

Peak boardings:

606	South_Central_LRT_NB	--	9	12.00	South Central LRT NB	--	--	1056.00
605	South_Central_LRT_SB	--	9	12.00	South Central LRT SB	--	--	3043.39
590	Grand_Ave_LRT_SB	--	9	12.00	Grand Ave (SB)	--	--	1467.04
589	Grand_Ave_LRT_NB	--	9	12.00	Grand Ave (NB)	--	--	2640.78

Off-Peak boardings:

597	South_Central_LRT_NB	--	9	12.00	South Central LRT NB	--	--	1503.79
596	South_Central_LRT_SB	--	9	12.00	South Central LRT SB	--	--	496.83
595	Grand_Ave_LRT_SB	--	9	12.00	Grand Avenue LRT SB	--	--	1284.84
594	Grand_Ave_LRT_NB	--	9	12.00	Grand Avenue LRT NB	--	--	730.41

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Bus & Light Rail Ride Guide
Economic Highlights
Fact Sheets
Future Transit Corridors
Green By Design
Project Report Cards
Safety Brochure
Station Art Guide
System Map
Performance Reports
Performance Dashboard
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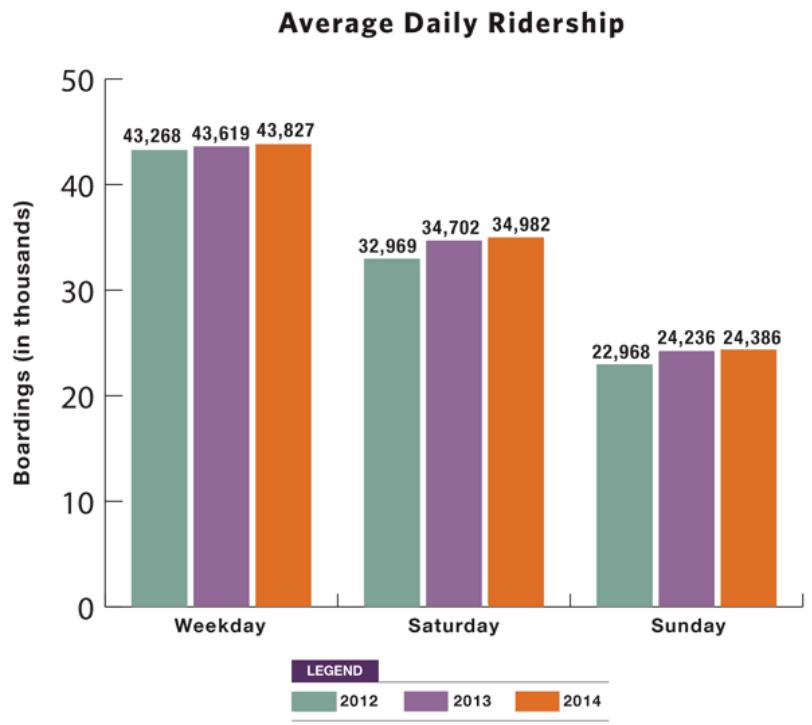
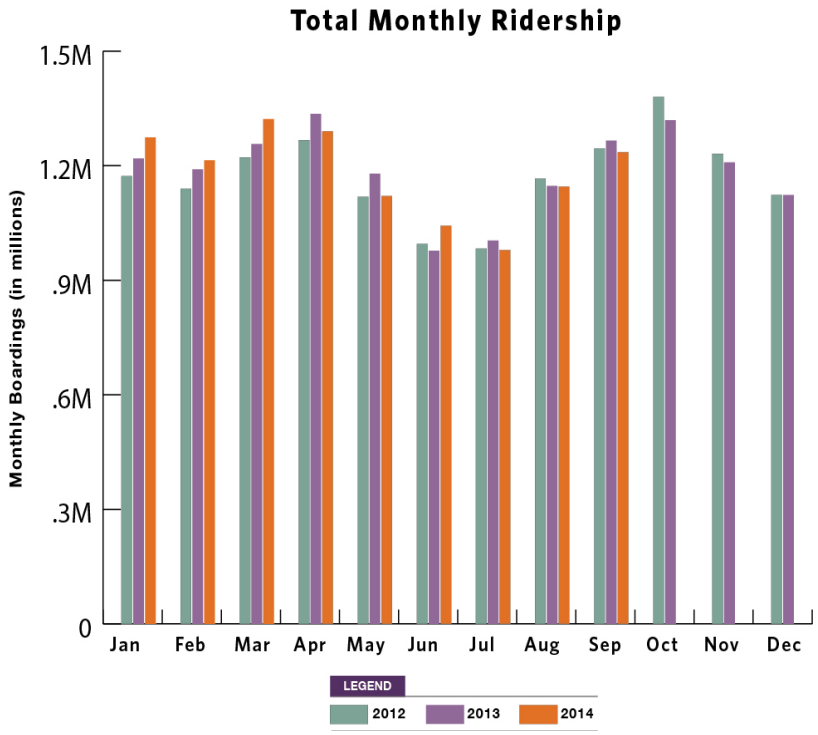
Ridership Reports

The Valley Metro Ridership Reports are updated monthly for the bus and light rail systems. The reports also include data that compares annual ridership for each fiscal year (July 1-June 30) for the entire transit system.

Bus/Rail Ridership | Rail Ridership





Annual Ridership Reports

- 2014 Ridership
- 2013 Ridership / 2013 Ridership by Station
- 2012 Ridership / 2012 Ridership by Station
- 2011 Ridership / 2011 Ridership by Station
- 2010 Ridership / 2010 Ridership by Station
- 2009 Ridership / 2009 Ridership by Station

Monthly Ridership Reports

2014

Aug | Jul | Jun | May | Apr | Mar | Feb | Jan

2013

Dec | Nov | Oct | Sep | Aug | Jul | Jun | May | Apr | Mar | Feb | Jan

2012

Dec | Nov | Oct | Sep | Aug | Jul | Jun | May | Apr | Mar | Feb | Jan

2011

Dec | Nov | Oct | Sep | Aug | Jul | Jun | May | Apr | Mar | Feb | Jan

Civil Rights Protections

Valley Metro is committed to operating its programs and services without regard to disability, race, color or national origin, in accordance with applicable federal statutes:

- **Title II of the Americans with Disabilities Act** | Public Notice/Policy Statement | Complaint Process
- **Title VI of the Civil Rights Act** | Public Notice/Policy Statement | Complaint Process

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All times given are approximate. Please be at bus stop at least five minutes prior to approximate times given.