Transit Parking Guidebook and Tool

PREPARED FOR:

Utah Transit Authority, in collaboration with:
- Utah Department of Transportation
- Mountainland Association of Governments
- Wasatch Front Regional Council

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DATE:

February, 2025

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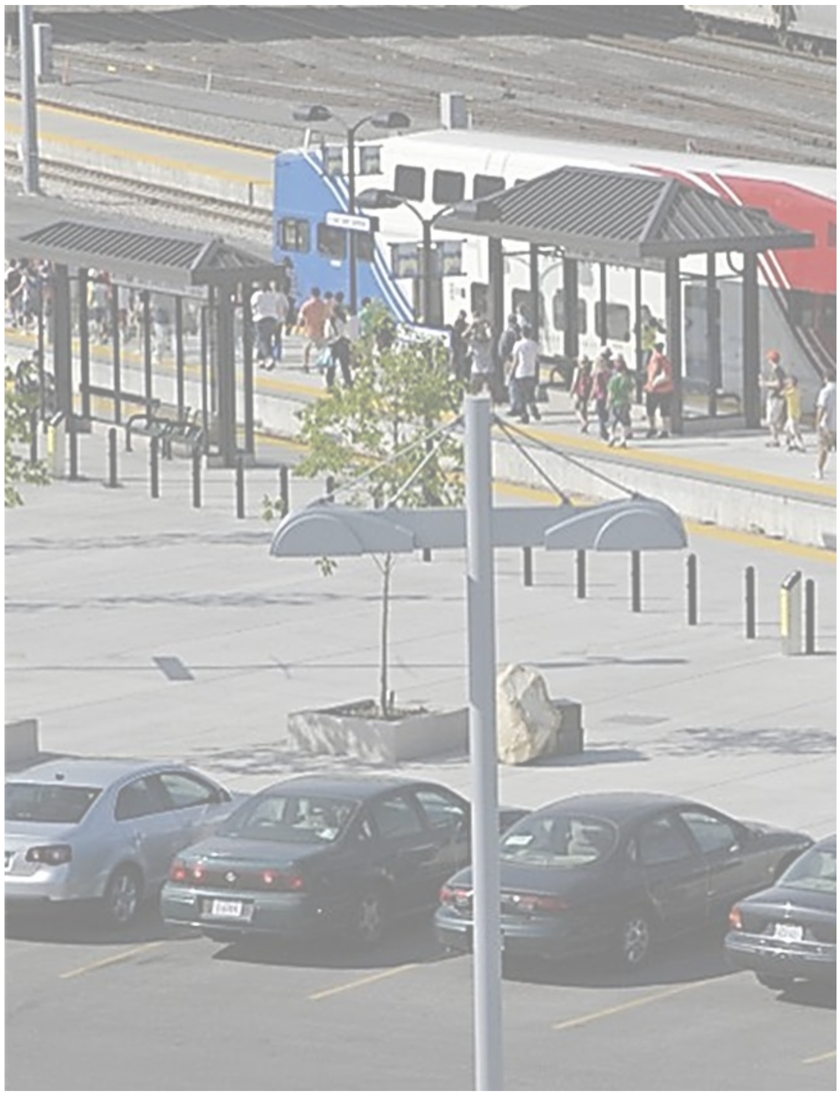
Introduction

Transit Parking Strategy Guidebook and Tool has been developed as part of an initiative led by The Wasatch Front Regional Council (WFRC), Mountainland Association of Governments (MAG), Utah Department of Transportation (UDOT), and Utah Transit Authority (UTA), referred to as partner agencies throughout this document, to modernize parking policies across the Wasatch Front. This guidebook and tool focus on right-sizing parking at transit stops and stations, especially in response to the passage of H.B. 462, which requires all cities with a fixed guideway transit station to develop a station area plan.



This guidebook and accompanying tool will allow UTA and its partner agency staff to right-size existing park & ride facilities and also plan future facilities with optimum supply considering various demographic, land-use, and transportation infrastructure factors that directly influence parking demand at these facilities. The guidebook recommends specific performance metrics that agencies can use to track the evolving contextual factors to take appropriate actions such as investing in active transportation connections, transit-oriented developments, among other actions that will further right-size land area allocated to vehicle parking for transit riders.

Goals and Objectives

Fehr and Peers staff conducted a work session with representatives from UTA, UDOT, WFRC, and MAG to discuss goals and objectives. The session aimed to ensure the guidebook aligns with the long-term vision and plans of Utah and the partner agencies, incorporating any new priorities. Based on the input received, the guiding Goals and Objectives of this guidebook and tool were established. The information below outlines broad aspirations that were refined into programmatic strategies.

Background

Provided below is a summary of stated goals and objectives in vision documents and long-term plans adopted by partner agencies for consideration in this process:

UTA Moves 2050

UTA has developed a 30-year Long-Range Transit Plan, UTA Moves 2050, to address the future needs of the communities it serves. The plan aims to strengthen partnerships, assess long-term transit needs, develop a system-wide vision, and establish implementation strategies. Below is a broader goal and draft vision:

- *Generate Critical Economic Return:* UTA aims to become a leader in climate change mitigation by setting goals to reduce fleet emissions, improve air quality, and promote transit-supportive community development to reduce vehicle dependence throughout the region.

- *Draft Vision:* Maintain Our System, Enhance Our System, Expand Our Frequent Service Network, and Serve Growth Areas.

Wasatch Choice Vision – Transportation Choices

The Wasatch Choice Vision is comprised of community-informed goals utilized by WFRC and MAG to guide transportation investments, development patterns, and economic opportunities. The four key strategies of the Wasatch Choice Vision are:

- Transportation Choices
- Housing Options
- Parks & Public Spaces
- City and Town Centers

The goal of transportation choices is to provide people with various options for getting around—driving, transit, biking, and walking—so they can easily reach their destinations. This includes:

- *Investing in transportation choices:* roads, trails, and transit.
- *Interconnecting most streets*: to reduce trip distances, disperse traffic, and make it easier to walk and bike.

- *Growing near transit*: creating opportunities for the development of city and town centers near transit to offer more transportation choices and reduce traffic congestion.
- *Designing walkable streets*: prioritizing walking and bicycling through the design of streets and adjacent land uses.

Mountainland Association of Government – TransPlan50

As part of its TransPlan50 vision document, MAG aims to create a more frequent and expansive transit system that operates reliably and offers an alternative to automobiles. A robust transit system can help reduce congestion, improve air quality, enhance commuter efficiency, and better serve underserved communities. The stated goals include:

- Enhanced Roadway Grid Network
- Expanded Freeways, Expressways, and Arterials
- Robust Regional Transit System
- Connected Active Transportation Network

The three plans—UTA Moves 2050, Wasatch Choice Vision, and MAG's TransPlan50—are interconnected, sharing common goals of creating an efficient transportation system, promoting sustainable growth, reducing congestion and environmental impact, and encouraging multimodal transportation options such as public transit, biking, and walking, while reducing single-occupancy vehicle use.

During the work session, all partners agreed that while all these visions and goals are important, the Wasatch Choice Vision is particularly well-articulated regarding transit, supporting amenities, and reducing single-occupancy vehicles. Therefore, it should be closely considered to inform the goals and objectives of this guidebook.

Common Themes and Ideas

To guide the themes and ideas to consider, a few broader goals were discussed and under each of these goals, discussed objectives to consider. This discussion was informed by prior review of peer agencies, including BART, TriMet, and King County Metro, who have developed similar plans and guidance on park-and-ride infrastructure:

Optimize Land Utilization

- Highest and best use of land adjacent to transit
- Monetize parking as an asset
- Support mixed-use transit-oriented development

Promote Non-Auto Modes of Travel

- Prioritize station area land to improve non-automobile connections
- Enhance infrastructure for better connections to station via walking and biking
- Encourage a transition away from automobile connections to stations

Right-size Parking

- Reduce or eliminate excess parking but maintain ridership levels
- Eliminate parking by non-transit riders

Equity and Sustainability

- Improve air-quality and reduce smog from mobile emissions
- Maintain affordable parking and reducing household transportation expense
- Reduce ecological footprint of facilities

Others

- Increase transit access to regional opportunities

Outcome of Engagement

UTA and its partners decided against charging for park-and-ride facilities to avoid financial barriers to transit use. They agreed to optimize these facilities through transit-oriented developments and encourage bike and pedestrian connections. Concerns were expressed about charging for parking, especially for those who do not regularly use transit, as it could impact accessibility.

It was suggested that the research include information on funding active transportation connections to stations, with a focus on accessibility for elderly, disabled, and marginalized users. The focus was directed on designing parking to support transit ridership and maximizing park-and-ride utilization.

A key climate goal is to improve air quality by reducing single-occupancy vehicle travel and enhancing active connections to stations. This includes minimizing the ecological footprint of park-and-ride facilities and repurposing land for multiple uses in Transit Oriented Development (TOD). Additionally, partners agreed on the goal of working to promote equitable and affordable transportation access, including electric vehicles and renewable energy infrastructure.

Adopted Goals and Objectives

Provided below are the four major goals that were taken forward to guide research, case studies, decision making framework and development of the tool.

1. Right-size Parking

- Develop strategies that optimize parking at station areas by encouraging and facilitating transit-oriented development that can take advantage of density, diversity of uses, development scale, proximity to transit and strategy such as shared parking to reduce parking demand.
- Develop methodologies for evaluating parking needs to support eliminating excess parking supply.

2. Incentivize active transportation connections

- Encourage bike and pedestrian connections to station areas.

- Improve bike and pedestrian infrastructure connecting to transit and active transportation amenities at stations and stops.
- Encourage non-automotive first- and last-mile connections to station areas.

3. Climate and Sustainability

- Improve air quality by encouraging alternatives to SOV travel, such as carpooling and active transportation, and encouraging transit ridership.
- Reducing the ecological footprint of park-and-ride lots.

4. Equity and Affordability

- Provide equitable access to transit via multiple modes.
- Assess equity of current charging practices for all modes of access.
- Maintain affordable access to transit and expand access modes.
- Promoting affordable housing near stations through TOD.

Literature Review

This section summarizes our comprehensive literature review of policies and strategies used by peer transit agencies across the country. The review focused on best practices, innovative approaches, and key challenges in planning, operating, and maintaining park-and-ride facilities. It included academic journals, case studies, and strategic planning documents. The findings highlight a multifaceted approach, including strategic location selection, capacity optimization, user-focused design, and integrating climate and equity considerations. These insights aim to reduce the ecological footprint of parking facilities and address the needs of vulnerable populations, aligning with adopted goals and objectives.

Effective Management of Existing Park-and-ride Facilities

Consistent with the goals and objective discussed in the previous section, there are several parking management strategies that can be implemented to incentivize use of active transportation modes to connect to the transit and increasing the vehicular occupancy of passenger cars that park in the existing facilities. These strategies do not rely on pricing to be effective and typically aimed at optimizing usage, improving accessibility, and enhancing the overall commuter experience. Provided below are a summary of strategies that transit, and other public agencies (cities/counties) have used with various degrees of effectiveness:

Carpool permits

Providing incentives for carpool parking, such as reserved parking spots in priority areas of the parking lot can increase the number of transit riders without increasing the amount of parking. In one user reaction survey roughly 1/4th of respondents stated that they would carpool if they got reserved parking.[1] Other agencies, such as Sound Transit in Washington, take this same approach. In the Sound Transit carpooling system, a vehicle can be registered to multiple transit riders. As long as more than 1 of those riders take transit in the day the vehicle is parked in a carpool spot then parking is free in the priority section of the

[1] Assessing Park-and-Ride Efficiency and User Reactions to Parking Management Strategies, 2016

parking lots.[2] While an analysis of UTA riders has yet to be performed, it is expected that relatively few park & ride users currently carpool to the parking lot. Without any additional incentives to encourage carpooling, priority and guaranteed parking may only result in a small increase in carpooling.

UTA's free Ridematch system helps riders to find people to carpool. A priority parking space that is marked only for carpools is not currently provided at park-and-ride facilities.

- ✓ Right size parking
- ✓ Incentivize Active Transportation
- ✓ Climate and sustainability
- ✓ Equity and Affordability

Shared Parking

Transit specific parking lots are expected to be busy during the typical work hours when many people use the park-and-rides as a method of commuting. However, the ability to share parking spaces between transit and other uses can lead to a reduction in total parking provided between the different uses. Some uses, such as a movie theater or church, have peak usage during times when there is low commuter parking demand. Sharing parking areas between transit and other commercial uses can provide transit with more consistent ridership and spread out the demand for parking spaces. Both BART and King County Metro encourage shared parking at park-and-ride stations.[3,4] In BART's access policy it notes that shared parking works best when the site uses have peak demand at different times throughout the day. Agreements between the shared use sites would be required to achieve maximum transit ridership and commercial visitation while minimizing areas dedicated to parking.

When having shared use of parking in park & ride facilities it is important to identify and differentiate transit versus non transit riders. This can be done through technology and can enhance ridership of transit system by incentivizing parkers who used the system.

- ✓ Right size parking
- ✓ Climate and sustainability

Shared Vehicles

Another option to increase access to destinations around stations is to have a parking space dedicated to shared vehicles. Shared vehicle services, such as Zipcar or Turo, can provide automobile access to many users throughout the day. Sound Transit requires vehicles like these to be authorized before a dedicated space can be assigned.[5] Dedicating a space for shared vehicles can allow multiple transit riders to take advantage of a vehicle without having access to their own vehicle. This could be particularly useful in more suburban stations where destinations are likely to be further away from the station.

In addition to the parking that is owned and operated by UTA, nearby parking can be utilized by transit riders. Transit riders using other parking sources can have negative effects so there are a few proposed ways of

- ✓ Right size parking
- ✓ Climate and sustainability
- ✓ Equity and Affordability

[2] Sound Transit Parking
[3] Metro Strategic Plan
[4] BART Access Policy Update
[5] Sound Transit Parking

minimizing pushback to expanded parking. This service can be further expanded to other park & ride facilities depending on the level of success and tweaks to the program such as convenient location of these car share spaces to make the program more successful.

Using On-Street Parking as Park & Ride with Parking Benefit Districts

Another option for utilizing parking that is not owned by UTA is to allow transit riders to park on nearby streets. Without any mitigation measures, local residents would likely push back against allowing nonresidents to park in their neighborhoods. But residents are more accepting if the area near the station is put into a parking benefit district. Under this scenario it would be necessary to charge for on street parking, only for nonresidents. Transit riders could still have free parking available at the park-and-ride. This could be a solution for park-and-ride lots that are already over capacity. The money that is collected from street parking would then be invested in transportation improvements within the parking benefit district. A successful example of such a district would be downtown Boulder Colorado.[6] Residents are more accepting of transit parking on their street if they can see tangible improvements that are funded from those additional vehicles. While a rider intercept survey found that current park-and-ride users are largely unwilling to pay for parking unless it is guaranteed.[7]

- ✓ Right size parking
- ✓ Incentivize Active Transportation
- ✓ Climate and sustainability

Improving Access for Non-Vehicular Modes

Stations can elevate the access of non-vehicles modes to increase ridership at stations. Providing multiple transit access modes (bus, BRT, light-rail, and heavy-rail) can increase a station's ability to service a wider range of riders. Allowing more bus connections to rail station stops can increase the catchment area of the rail service. Providing employer discounts may incentivize some commuters to switch to transit from driving. The Eco Pass Program and Farepay cards are already established methods within the UTA system. The Farepay card in particular could increase transit ridership at P&R lots by discounting the bus connection to the P&R transit station. The increased modality of a station could increase station riders without impacting the amount of parking provided.

Biking infrastructure is another aspect of multimodal access that stations can improve upon. Providing free bike lockers or sheltered bike racks increases the bike friendliness of transit stations.[8] BART provides a variety of bike parking, including bike lockers accessible via phone, or reservable lockers that require a physical key. The bike lockers that can be accessed with an app on a smartphone are provided through BikeLink and are much more prevalent with over 1,800 available throughout the system.[9] BART's system charges five cents per hour with a maximum of 24 hours. The bike lockers are typically in a covered space

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6 BART Access Policy Update
7 Assessing Park-and-Ride Efficiency and User Reactions to Parking Management Strategies, 2016
8 BART Access Policy Update
9 Bike on BART

which reduces the wear and tear on the lockers themselves. Besides lockers BART also provides monitored bike stations that are fenced in and covered areas with racks for bike parking.

More recently, City of Portland Bureau of Transportation[10] recently decided to phase out bike lockers in favor of rooms that are secured because these are much cheaper to maintain on a per-spot basis.

On the other hand, TriMet in Portland has a fairly small amount of bicycle parking at stations, but all transit is designed to carry riders with bicycles. As a result, more transit riders take their bikes on board trains than riders that park their bikes at the stations.[11] Portland also designs their dedicated bike paths to provide easy access to multiple transit stations, which further encourages regional biking and transit ridership. The bike friendliness of a transit station is also reliant on suitable bike infrastructure surrounding the station to make the station more accessible via bikes. The previously discussed transit rider intercept survey found that 12% of riders would be more willing to bike if there were better parking spaces at the station, while 20% of riders were more willing to bike if the neighborhood had better biking access to the station.[12] Minneapolis has secure bike & ride parking facilities that can only be entered with a transit pass. Scanning your transit pass for that trip unlocks the gated door to be able to access the bike racks.[13] UTA could pursue building more secure bicycle parking, either lockers or fenced in bays, and have the ability to access the bike parking available on a rider's phone. If the lockers or stations are able to be unlocked with a phone that reduces the hurdle of requiring a physical card or key and would make the bike amenities available to a larger percentage of transit riders. Wider ranging plans could include coordinating with local municipalities in the placement of dedicated bike paths and allowing more space on all vehicle types for transit riders with bicycles.

In addition to providing more bicycle parking options, and improving the quality of bicycle parking, stations can provide bike share stops (such as GREENbike) for transit riders to make short trips on. Park & ride lots can provide space dedicated to micromobility such as bikeshare docking stations and/or dedicated parking spaces for scooters or bikes. These dedicated spaces make micromobility more apparent and easier to use than stations where scooters are left in random spaces. BART has integrated micromobility services into its multi-modal trip planner, which allows transit riders to see where micro transit scooters are available.[14] Integrating the micromobility services into the transit and other related online services makes the transition between modes much simpler for a transit rider. Micromobility groups report that planning/payment integration and co-location of transit and micromobility are key to the two supporting ridership on one another.[15] UTA will likely need to partner with a micromobility provider to ensure that multiple stations have bike or

- ✓ Incentivize Active Transportation
- ✓ Climate and sustainability
- ✓ Equity and Affordability

[10] City of Portland phasing out bike lockers in favor of rooms
[11] Integrating Bicycling and Public Transport in North America
[12] Assessing Park-and-Ride Efficiency and User Reactions to Parking Management Strategies, 2016
[13] Bicycles and Transit
[14] BART riders can roll easy with new e-scooter options
[15] Transit & Shared Micromobility Integration

scooter options available. It is most likely that these would work better at stations in more urban environments with other micromobility stations nearby.

Parking Time Restrictions

Implementing time limits on parking to ensure turnover and availability for daily commuters can be effective in focusing the parking supplies to directly serve the needs of the transit riders. If time restrictions are not implemented, overnight and longer terms parkers can reduce the effective supply of park-and-ride facilities in locations where parking is constrained, encouraging misuse of parking or use by non-transit patrons. Los Angeles Metro has a unique way of securing parking for commuters in its park-and-ride facilities by providing preferred parking in facilities where parking occupancy regularly reached 90%. Under the preferred program, spaces located in most convenient proximity to the station are marked as preferred. Patrons register for these spaces online and pay a monthly or daily fee to access the spaces. After 11:00 AM on a weekday all marked spaces become available to other patrons.

UTA offers free parking for active transit users at its park & ride lots. Some lots offer single day parking while others offer multi day parking as of July 1st, 2013, UTA has made parking free for all passengers at TRAX and FrontRunner park and rides. Most lots allow long-term parking with a rider notifying UTA police if the vehicle will be parked longer than seven days.

✓ Right size parking

Notes from Peer Agencies on Successes and Lessons Learned

King County Metro conducted a parking management study in 2015 and interviewed the following transit agencies to review park & ride strategies that King County Metro could employ to increase transit ridership via park & rides:

- Dallas Area Rapid Transit (DART),
- Metro Transit in Minneapolis-St. Paul,
- Bay Area Rapid Transit (BART), and
- Washington Metropolitan Area Transit Authority (WMATA)

Provided below are key takeaways for King County Metro to consider in order to improve ridership at stations with park-and-ride facilities.

- Restripe existing lots,
- Introduce reservable carpool parking permits,
- Improve bike access and storage,
- Improve kiss-and-ride and rideshare access,
- Create shared vehicle parking, and
- Introduce free reservable permit parking.

Additional highlights from the interview are discussed below by each agency interviewed:

Dallas Area Rapid Transit (DART)

- DART's Success with Subsidized Uber Service: Providing subsidized Uber rides to and from park & ride stations has been well-received.
- Priority Parking Spaces for Shared Vehicles: DART's initiative to offer priority parking spaces closer to transit for shared vehicles like Zipcar has also been popular.

Recommendation: UTA's Innovation Mobility Zone: With UTA's Innovative Mobility Zones, there could be possible integration with TNC's such as Uber or Lyft, similar to DART's mode. Enhancing drop-off/pick-up areas for kiss & ride and TNC users, with designed zones near transit stops can improve organization and convenience for transit riders, which DART has proven is a successful model.

Minnesota's Metro Transit

- Metro Transit's Approach to Overcapacity Park & Rides: Metro Transit collaborates with owners of nearby parking lots (e.g., churches, retail) that have complementary usage patterns. Agreements are tailored to each site.
- Signage and Enforcement: Some parking lots have signage indicating areas for transit riders, while others lack signage or enforcement.

Washington Metropolitan Area Transit Authority (WMATA)

- WMATA's High Utilization and Parking Charges: WMATA's park & ride lots have high utilization and have charged for parking since inception. They have significant parking management policies, despite ending a carpool parking program due to enforcement challenges.

Recommendation: UTA should consider enforcement ease if implementing carpool parking.

- Car Sharing at WMATA: Car sharing is popular at WMATA park & rides, contracted to Enterprise. Enterprise pays WMATA for space usage, and users pay Enterprise for car sharing. This service is most popular at urban stations with lower car ownership.

Recommendation: UTA could start with a few spaces at select stations and expand based on demand.

Bay Area Rapid Transit (BART)

- BART's Park & Ride Pricing and Restriping: BART introduced park & ride pricing in 2015 and restriped lots with narrower 8-foot-wide stalls (down from 8.5 feet). This change was generally acceptable to users and increased lot capacity by 8-10% for highly utilized park & ride lots.

The study also explored potential strategies to reduce on-street parking impacts if park & ride lots are highly utilized. Two strategies that stood out were implementing time limited parking for non-residents or identifying "designated" zones on underutilized streets. These would still allow transit users to park on the street but would reduce the conflicts between transit users and street residents or businesses. Some additional recommendations from the study were to improve non-vehicle access. This could be done by improving bike parking with lockers or sheltered and enclosed parking spaces.

The study recommended that a portion of all park & ride lots be reservable permits. The permits would be released based on priority of transit users, first they would be available to carpool permits, then regular users of transit, then open to any reservations. With a portion of the park & ride still first-come first-serve this reservation system would not discourage new riders but would add reliability for frequent riders.

Transit Oriented Development (TOD)

A much larger scale process that UTA can pursue is that of developing select lots into Transit Oriented Developments (TOD) that can preserve or increase ridership and reduce the footprint of parking lots serving stations. Alternatively, park-and-ride facilities can share parking with uses within the TODs to fully optimize use of spaces in these lots. Renting or selling a portion of the land that is currently used for surface lot parking can provide a transit agency with positive cash flow, and provide dense, and affordable, housing near transit and also increase the number of potential transit riders at the station.[16] In small and mid-sized cities low income populations are more likely to use transit.[17] Policy changes, such as requiring developers to include affordable units within a TOD area could provide potential riders with housing options directly next to transit. A higher level of analysis is required to determine on a case-by-case basis which park-and-rides would be appropriate for developing.

While the translation of TOD to transit ridership is complex and very context specific, it is widely believed that TOD has a net positive environmental impact for station area. One study found that TOD areas have one-half to one-third as much vehicle trip generation as what the Institute of Transportation Engineers (ITE) would predict.[18] Along with lower vehicle trip generation, TOD areas also require less parking because TODs typically include a mix of two or more users that are complementary to each other with respect to parking and traffic generation. When combined with parking management strategies, TOD can greatly reduce the necessary parking for a station area neighborhood. The effects on transit ridership of transitioning a park-and-ride lot to TOD is difficult to determine with accuracy because it can depend on a variety of factors including but not limited to demographics, number of destinations served by the transit line, scale of development, density of the uses, diversity of uses, design of uses (design which is conducive to pedestrian and bike access and connections can reduce parking demand), etc. It is very specific to the context of the station neighborhood.

BART has developed a manual for assessing different scenarios of replacing park-and-ride parking with TODs. The majority of these scenarios usually include providing roughly the same level of park-and-ride spaces as the lot previously had. The manual focuses on one station at a time and provides evaluation for three development scenarios. The first step of the development process is to collect station data such as:

- Average weekday ridership,
- Population/employment within ½ mile,
- Dedicated BART parking,

[16] TOD and Park-and-Ride: Which is Appropriate Where?
[17] APTA Who Rides Public Transportation
[18] Trip and Parking Generation at Transit-Oriented Developments: Five US Case Studies

- Parking utilization at 1PM,
- Number of BART parking spaces per weekday rider,
- Access to other transit, and
- Relevant city plans for the immediate area.[19]

The second step is to assess any issues that might arise from replacing or restructuring the station's parking lot. The next step is to create three development scenarios to compare with the existing condition. In step four, the top three scenarios are explored in more detail, as shown in **Figure 1** below.

Step five involves evaluating the scenarios based on the agency's defined redevelopment goals (e.g., reducing vehicle miles traveled (VMT), increasing station ridership, increasing revenue). This final step determines the type and intensity of development the agency wants to pursue. The agency has two tools for assessing the ridership and revenue impacts of developing park-and-ride locations. The ridership impact estimator is shown in **Figure 2** below.

As seen in Figure 2, assessing the impacts of removing parking spaces requires estimating current private vehicle occupancy. It also assumes that some riders who can no longer use the park-and-ride will use other stations and not lose transit access. This necessitates analyzing parking capacity at nearby park-and-ride stations. Many scenarios in the report maintain the same amount of park-and-ride parking. For scenarios without a reduction in parking stalls, no decrease in ridership is assumed.

Figure 3 below displays the financial impact of development on the agency. Revenue sources for BART include fare revenue, parking fee revenue, ground rent revenue, and any additional revenue from specific developments, such as grants. If free parking is provided, parking revenue would be non-existent, and revenue would mainly come from fare revenue and ground rent. Ground rent revenue is the expected price the agency could charge a developer to build a multiuse building on the identified square footage.

[19] BART Replacement Parking for Joint Development

Figure 1: BART Development Scenarios Metrics

	Existing Condition	Scenario A	Scenario B	Scenario C
Size of development parcel				
# units residential (rental)				
# units for sale housing				
Retail (sf)				
Other land use (sf)				
# of BART parking spaces on development site				
Unused spaces at BART station assumed to be available for those displaced by development				
Off-site replacement of BART spaces (in station area)				
BART patron parking resources at another station area (BART or non-BART facilities)				
Parking spaces provided for joint development				
BART parking spaces shared with the joint development				
Total non-shared spaces provided (BART + joint development)				
Parking charges on the BART parking				
New transit/shuttle programs				
New carpool program/ incentives				
New walk/bike programs				
New on-street parking management programs (e.g., permit or time limits)				
Other access improvements				
Economic issues				
Local barriers to TOD and how they are addressed				

Source: BART Replacement Parking for Joint Development

Figure 2: BART Ridership Impacts of Parking Changes

Ridership Impact from Changes in Parking Supply

If the number of spaces for BART patrons are reduced, then riders may be displaced. This analysis assumes that a percent of riders switch to another BART access mode when their space is removed, and are therefore retained as BART riders. 1998 BART Access study provides a guide on the overall mode choice pattern at the station.

Checklist

Are there available spaces at 9:00 AM? → No

Yes

No loss of ridership, since excess spaces exist

No	Scenario A	Scenario B	Scenario C
Number of spaces reduced	-	0	0
Space turnover (cars parked per day)	1	1	1
Number of people per car	1.1	1.1	1.1
Number of auto access boardings reduced		0	0
Percent that find another access mode and continue to use BART	0%	0%	0%
BART boardings retained, change to another access mode	-	-	-
Net boardings loss	-	-	-
Ridership loss @ 2 trips per station boarding	0	0	0

Source: BART Replacement Parking for Joint Development

Figure 3: Financial Impacts of Parking Development

Impact on Costs and Revenues

Revenue factors	Scenario A		Scenario B		Scenario C	
Fare revenue	*Variables*	*Annual revenue*	*Variables*	*Annual revenue*	*Variables*	*Annual revenue*
Ridership impact of joint development	0		0		-	
Ridership impact of change in pkg. supply	0		0		0	
Ridership impact of parking charge programs	0		0		0	
Ridership impact of other access programs					0	
Net change in ridership	0		0		-	
Average fare	$ -		$ -		$ -	
Fare revenue		$ -		$ -		$ -
Parking revenue						
Change in number of space under reserved parking	0		0		0	
Monthly cost of reserved parking	$ -		$ -		$ -	
Cost of collection	10%		10%		10%	
Net revenue from reserved parking		$ -		$ -		$ -
Number of spaces under paid parking	0		0		0	
Daily parking price	$ -		$ 3.00		$ 5.00	
Cost of collection	30%		30%		30%	
Annualized capital cost of parking chg. equipment	$ -		$ -		$ -	
Net revenue from parking charges		$ -		$ -		$ -
Combined parking revenue		$ -		$ -		$ -
Ground rent after replacement parking						
Fair market land value	$0.00		$0.00		$0.00	
Parcel size	-		-		-	
Land value	$ -		$ -		$ -	
Replacement capital cost per space	$ 15,000		$ 15,000		$ 15,000	
Number of spaces replaced	0		0		0	
Cost of replacement parking	$ -		$ -		$ -	
Residual	$ -		$ -		$ -	
Annualization factor	0.1		0.1		0.1	
Ground rent after parking costs		$ -		$ -		$ -
Grant/partnership revenue						
Amount	0		0		0	
Annualization factor	0.1		0.1		0.1	
Annualized grant/partnership revenue		$ -		$ -		$ -
Total annual revenue		$ -		$ -		$ -
Cost factors						
Change in parking operating costs						
Parking operating costs		$ -		$ -		$ -
BART operating costs						
Other BART costs (e.g., new service, imp. etc.)		$ -		$ -		$ -
BART participation in other access operating costs						
Amount		$ -		$ -		$ -
BART participation in other access capital costs						
One-time capital cost	$ -		$ -		$0	
Annualization factor	0.1		0.1		0.1	
Annualized capital costs		$0		$0		$0
Total annual cost		$ -		$ -		$ -
Net annual impact		$ -		$ -		$ -

Source: [BART Replacement Parking for Joint Development]

Using the tables provided above, BART ranks the three scenarios against the existing conditions and decides which scenario they want to pursue.

It should be noted that the number of spaces provided for joint development, or for shared use parking is highly context specific. As noted earlier, TOD development can have parking rates much lower compared to the zoning code requirements or ITE Parking Generation manual estimate. BART also recognizes that the larger station area neighborhood has a significant impact on the success of a TOD project. When park-and-rides are turned into TODs, they perform much better for the transit agency in terms of ridership if the larger neighborhood is already dense and more transit oriented. TOD is less effective for the transit agency when it is in a highly suburban landscape with few supporting features surrounding the station.

Other studies have found that TOD only increases transit ridership when the density of the development is significantly high, this also is reliant on larger neighborhood areas to be developed in a more TOD manner than a typical suburban community.[20] One benefit that TOD can have, even at lower density, is in reducing total VMT as compared to a standalone park-and-ride. The transit ridership may not increase, but by providing more housing and destinations near transit, mobile emissions may be reduced. While the density that is necessary for "successful" TOD varies, the density is viable at all but the most isolated transit stations.[21] A separate literature review of assessing park-and-rides versus TOD found that park-and-rides are more practical in low density suburban station settings.[22] These stations can attract transit customers from areas that are not easily served by any form of transit and therefore are useful at expanding the pool of potential riders.

Measurements

Based on our review of case studies of other transit agencies, provided below are some measurements that UTA can use to track the effectiveness of its park-and-ride facilities. These measurements may be useful for identifying the performance of park-and-ride lots as well as creating typologies of station area and park-and-ride facilities serving these stations or stops.

- Daily riders at station/stop
- Park-and-ride designated spaces
- Daily riders per park-and-ride space
- Parking utilization (typically measured in late morning after the typical morning peak travel period)
- Land-use zoning and density in the station area neighborhoods
- Type and quality of multimodal connections to the station/stop

[20] Would the Replacement of Park-and-Ride facility with TOD reduce vehicle kilometers traveled?
[21] Would the Replacement of Park-and-Ride facility with TOD reduce vehicle kilometers traveled?
[22] TOD and Park-and-Ride: Which is Appropriate Where?

Partner Coordination

UTA should consider working closely with its partners when implementing management strategies or policy changes at the park-and-ride facilities. These entities include:

- Local municipalities
- Nearby institutions (schools, hospitals, large businesses)
- Business owners
- Property owners
- Residents in the immediate station vicinity
- Station riders

To effectively communicate with various partners, BART uses a 3-step process. Step one is to understand the parking issue from all perspectives. This includes what, when, where, who and why of parking issues.[23] The middle step is to consider alternative strategies. Figure 4, below, shows the framework for off street parking issues and solutions. This figure is meant to be a starting point of more in-depth discussion between all of the partners. The final step is to design and implement parking programs that have been decided upon by the stakeholder group. By involving a wider range of stakeholders from the beginning, BART reduces the likelihood of pushback to their proposed solutions.

As this project to develop a parking strategy guidebook for UTA progresses, it is likely that additional literature will be reviewed for the corresponding stages of the study. This review will provide background for work that is specific to UTA's operating conditions.

[23] BART Parking Management Toolkit

Figure 4: BART Common Parking Issues and Solutions

Parking Issue	Access control (gate arms, validation systems)	Enforcement	Employer programs	Time limits and restrictions	Signage/ITS/design	Shared parking	Parking cash-out	Parking charges	Provide more parking	Alternatives to driving
1. Convenient spaces are not available to shoppers in commercial areas.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2. Parking lots and structures are usually full.			✓	✓		✓	✓	✓	✓	✓
3. Parking patterns are uneven.	✓	✓		✓	✓	✓	✓	✓		
4. Parking "poaching" is occurring-parkers from one use occupy parking provided for another use.	✓	✓	✓	✓	✓			✓	✓	
5. Cars are parked for long periods of time, excluding daily parkers.		✓		✓				✓		

✓ = a suitable response

Source: BART Parking Management Toolkit

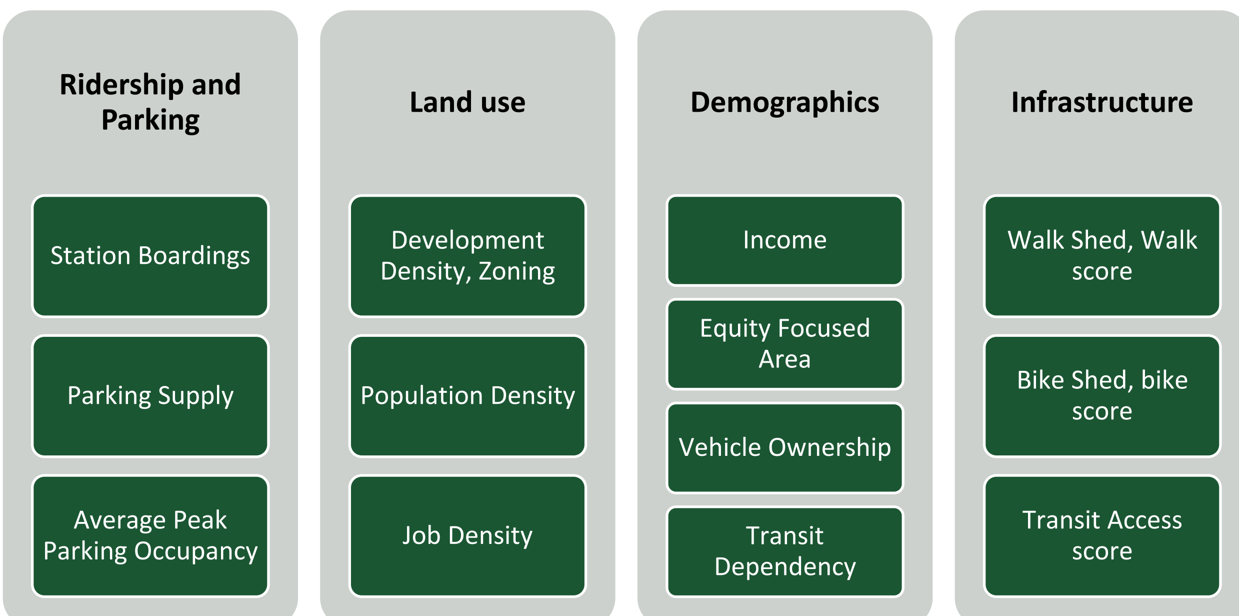
Mapping and Data Analysis

To develop a comprehensive understanding of the existing contextual environment around the park & ride lots adjacent to UTA stations, a thorough analysis of various data and maps was conducted. This analysis included examining parking capacity, occupancy, and ridership data, as well as demographics, geospatial information, and accessibility scores. Information analyzed under this section was later used to create detailed typologies for the park & ride lots. These typologies, along with their specific criteria, provide valuable insights into the functionality and efficiency of each lot. Data collected was sorted under four different categories:

1. Ridership and Parking
2. Adjacent Land-use
3. Demographics
4. Quality of Transit and Active Transportation Infrastructure

Figure 5 shows the different data elements acquired and assessed during this exercise.

Figure 5 – Data Elements Analyzed



Provided below are a set of maps prepared to help identify stations that have similar contextual elements and can be grouped under the same typology.

Figures 6 – 1 through 6 – 3 show survey supply, and parking utilization of the each of the park & ride facilities. The figures also show, with a blue circle, the relative parking supply needed to meet existing demand compared to existing supply.

Figure 6 -1: Existing Parking Supply, and Utilization at Park & Ride Facilities

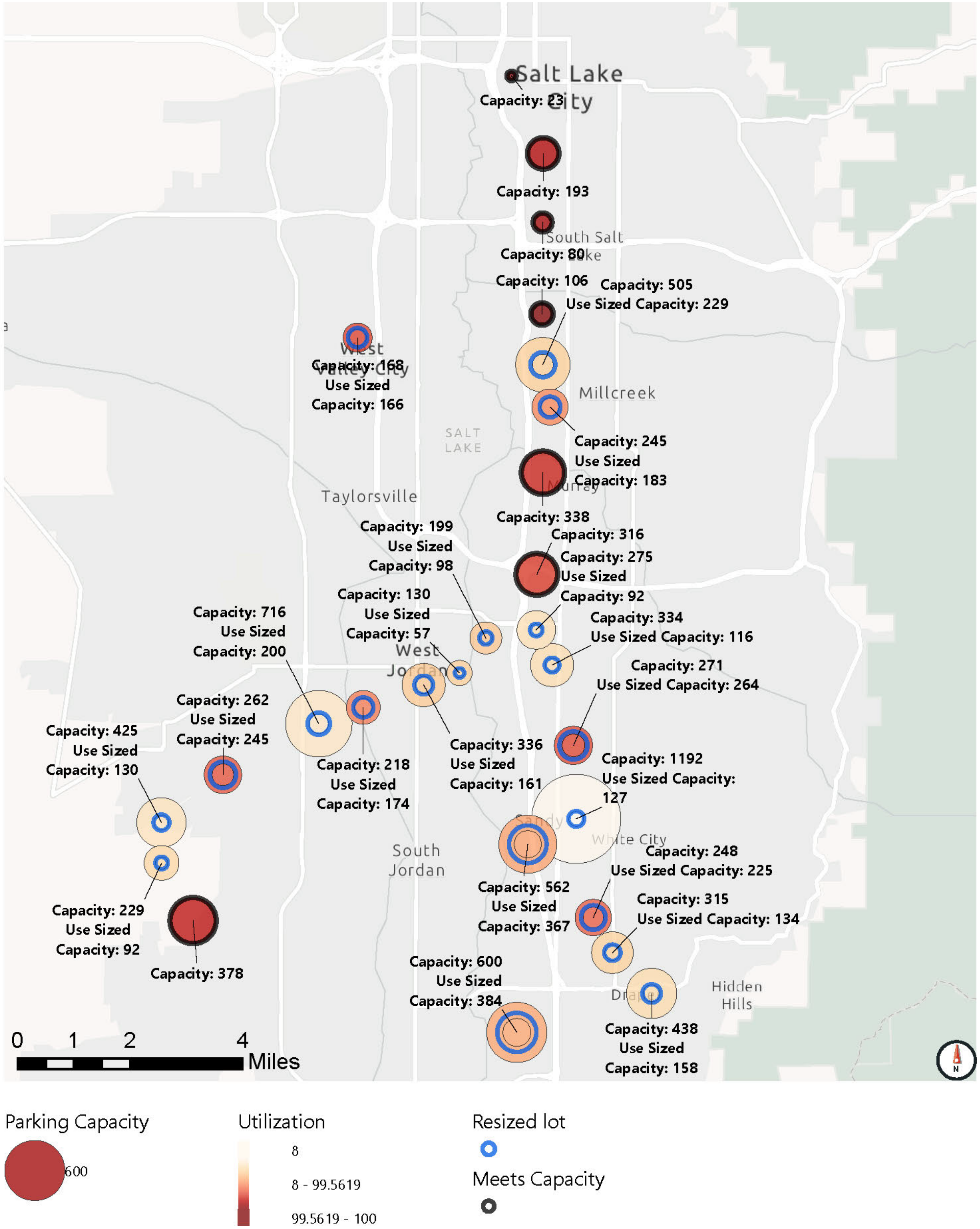


Figure 6 – 2: Existing Parking Supply, and Utilization at Park & Ride Facilities (Continued)

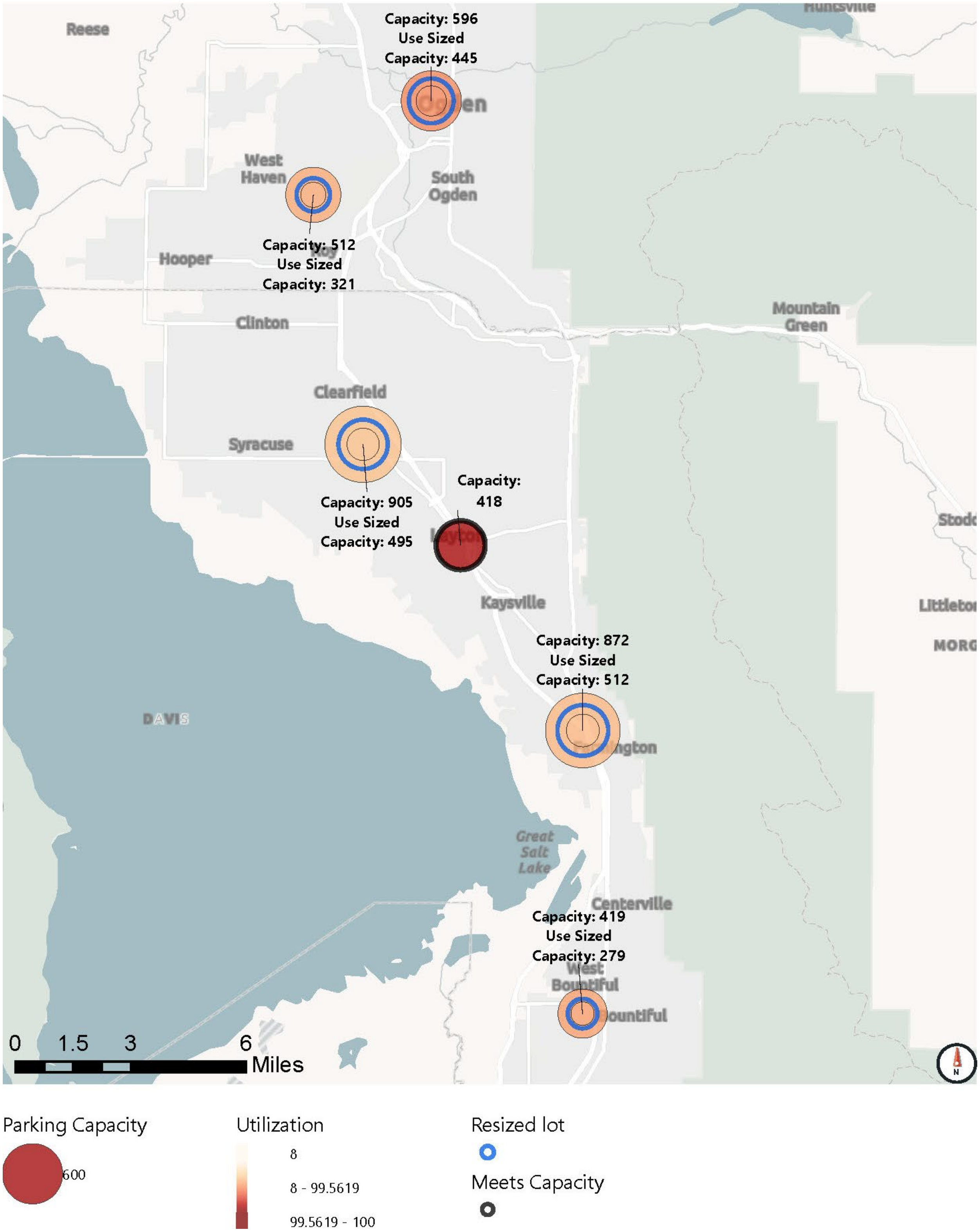
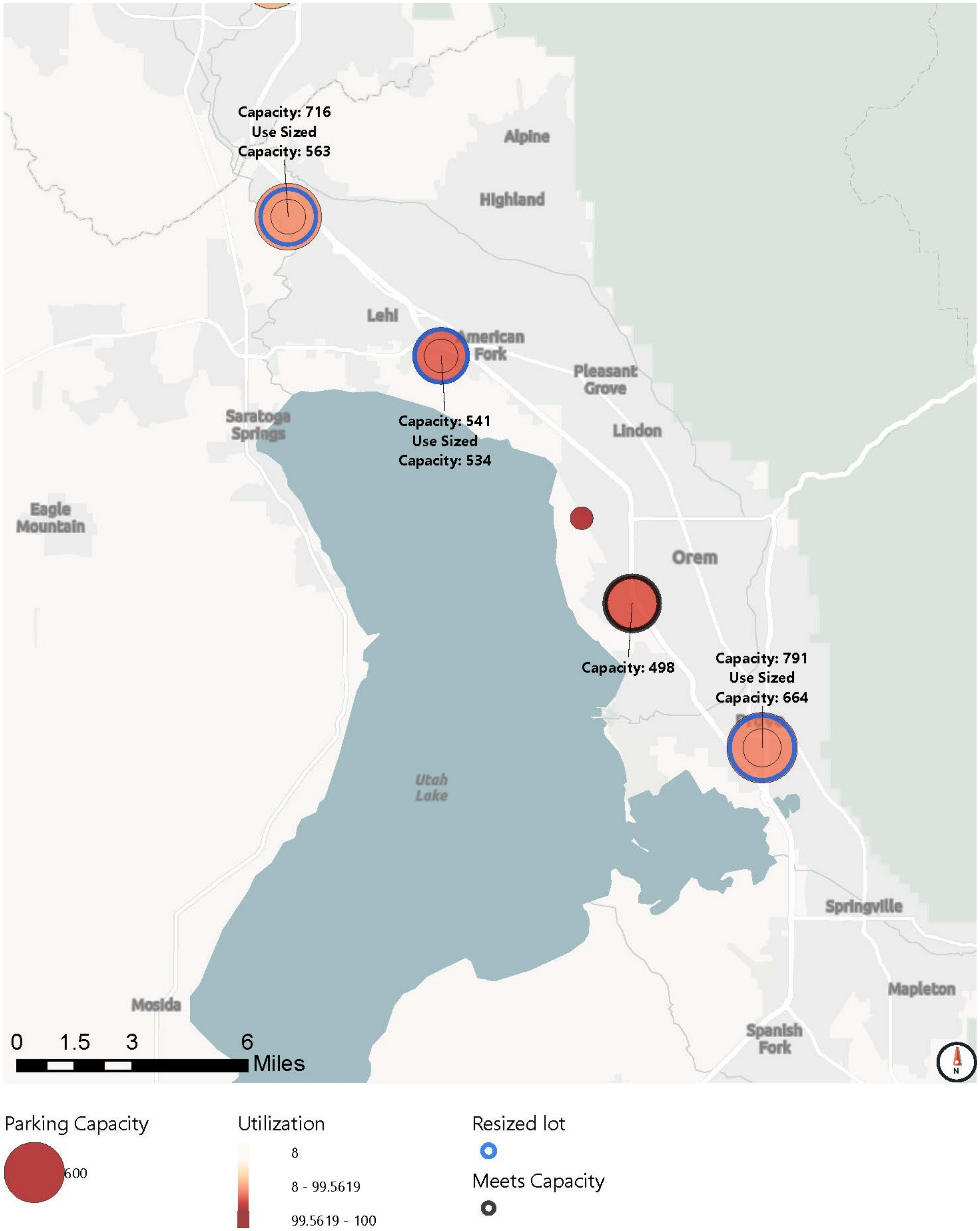


Figure 6 – 3: Existing Parking Supply, and Utilization at Park & Ride Facilities (Continued)



As shown in Figures 6-1 through 6-3, most locations with a higher parking supply compared to demand are along mid-line stations. In these areas, the demand for transit ridership-related parking from the immediate neighborhood is limited, making it essential to connect to transit. The excess surface parking in these locations has the greatest potential for land use, changes adjacent to high-quality transit to better serve riders.

We then divided the boardings data by the parking utilization data to calculate **boardings per parked car (BPPC)** for each park & ride facility. This metric was found to be the most useful for tracking transit riders' dependency on parking at each facility. A comparative analysis revealed that BPPC generally correlated with the location of the transit station along the transit line, population density, job density, and urban development. Urban area station locations within Salt Lake City had a higher BPPC ratio (above 25), while suburban mid-line station locations had a lower BPPC ratio (under 5). This indicated that park & ride spaces are essential for connecting to transit in suburban areas, while riders in urban areas are less dependent on these parking spaces due to higher quality access to other modes such as buses, biking, walking, and rolling. The BPPC ratios at each park & ride facility were layered on top of demographic and accessibility data to establish a complete context for each location. Provided is a brief list of land-use, demographic, and accessibility factors analyzed:

- **Population Density** – Census population data by block group was divided by land area to calculate population density.
- **Jobs Density** – Census employment data by block group was divided by land area to calculate job density.
- **Low Income Households** – The percent of the population within the block group below the federal poverty line
- **Zero Car Households** - Percent of households within the block group with no car.
- **Transit Dependency Index** - This index is a score by combining the normalized scores of individual variables such as youth population, elderly population, families in poverty, and households without a car.
- **Accessibility scores**: This includes walk, bike and transit access scores calculated as described below:
    - *Walk score*: The walkshed areas were compared to each other and the largest walkshed by area was scored 100 and the smallest walkshed was scored 0
    - *Bike score*: The bikeshed areas were compared to each other and the largest bikeshed by area was scored 100 and the smallest bikeshed was scored 0
    - *Transit access score*: The station that had the most different transit (FrontRunner, TRAX, and bus) lines scored 100, the station with the least lines (one) scored 0.

Figures 7 and Figure 8 are examples of population density and job density data reviewed. Figure 9 shows an example of transit dependency data layered along with BPPC data. Figure 10 shows an example map of visually analyzed bike, walk and transit scores. Figure 11 shows an example of regional destinations.

Figure 7 – Population Density and Boardings per Parked Car Ratio

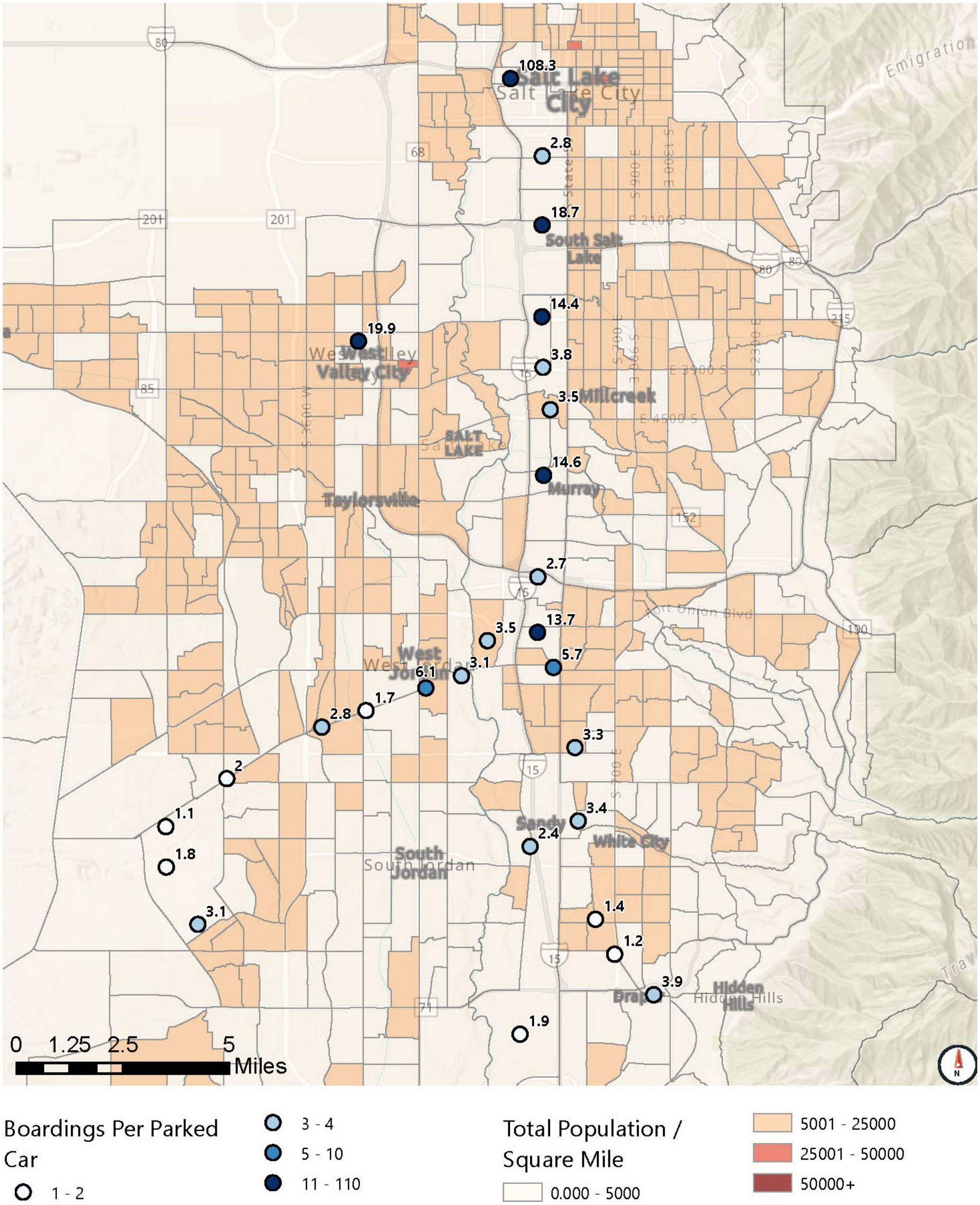


Figure 8 - Jobs Density and Boardings per Parked Car Ratio

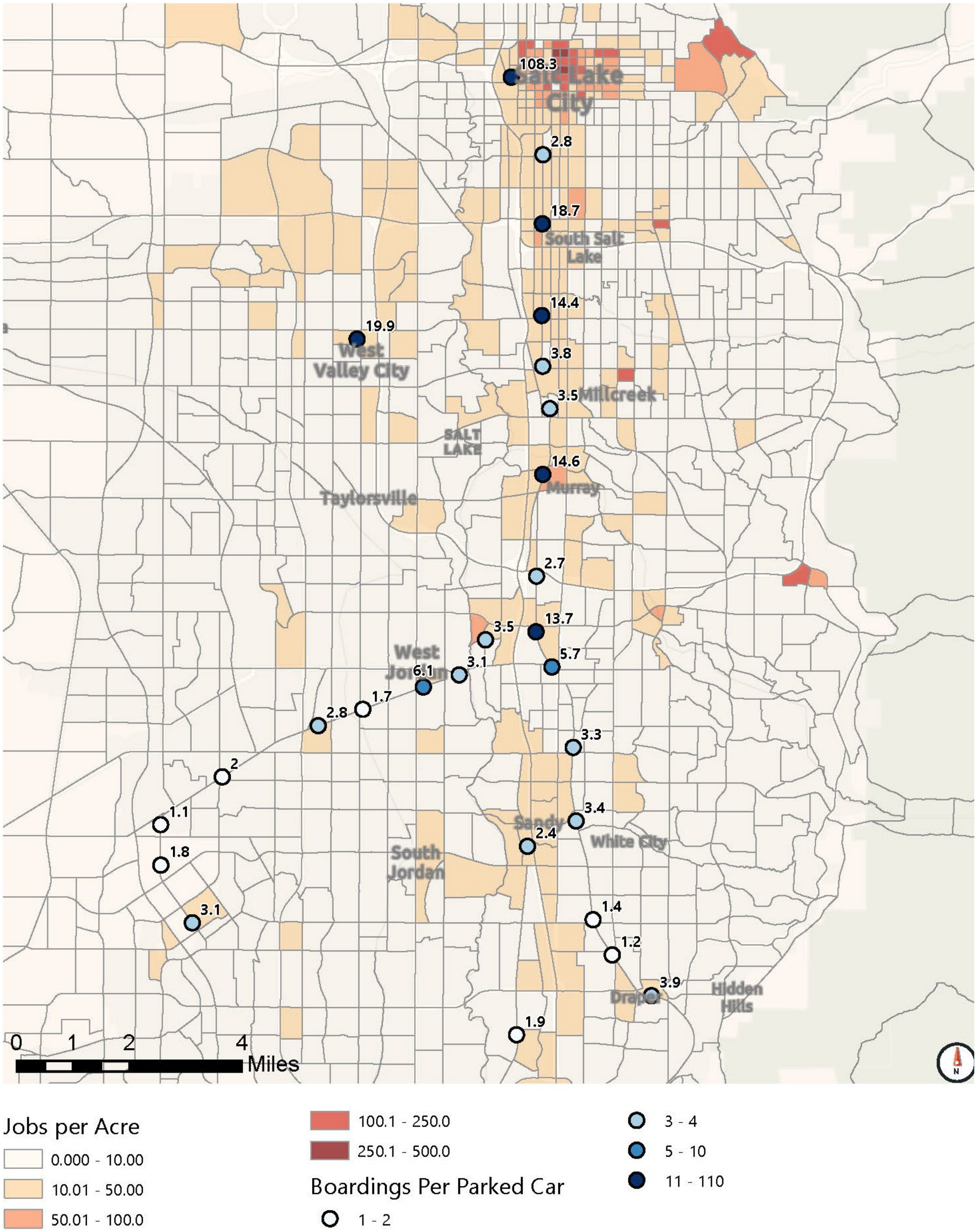


Figure 9 – Transit Dependency Index and Boardings per Parked Car Ratio

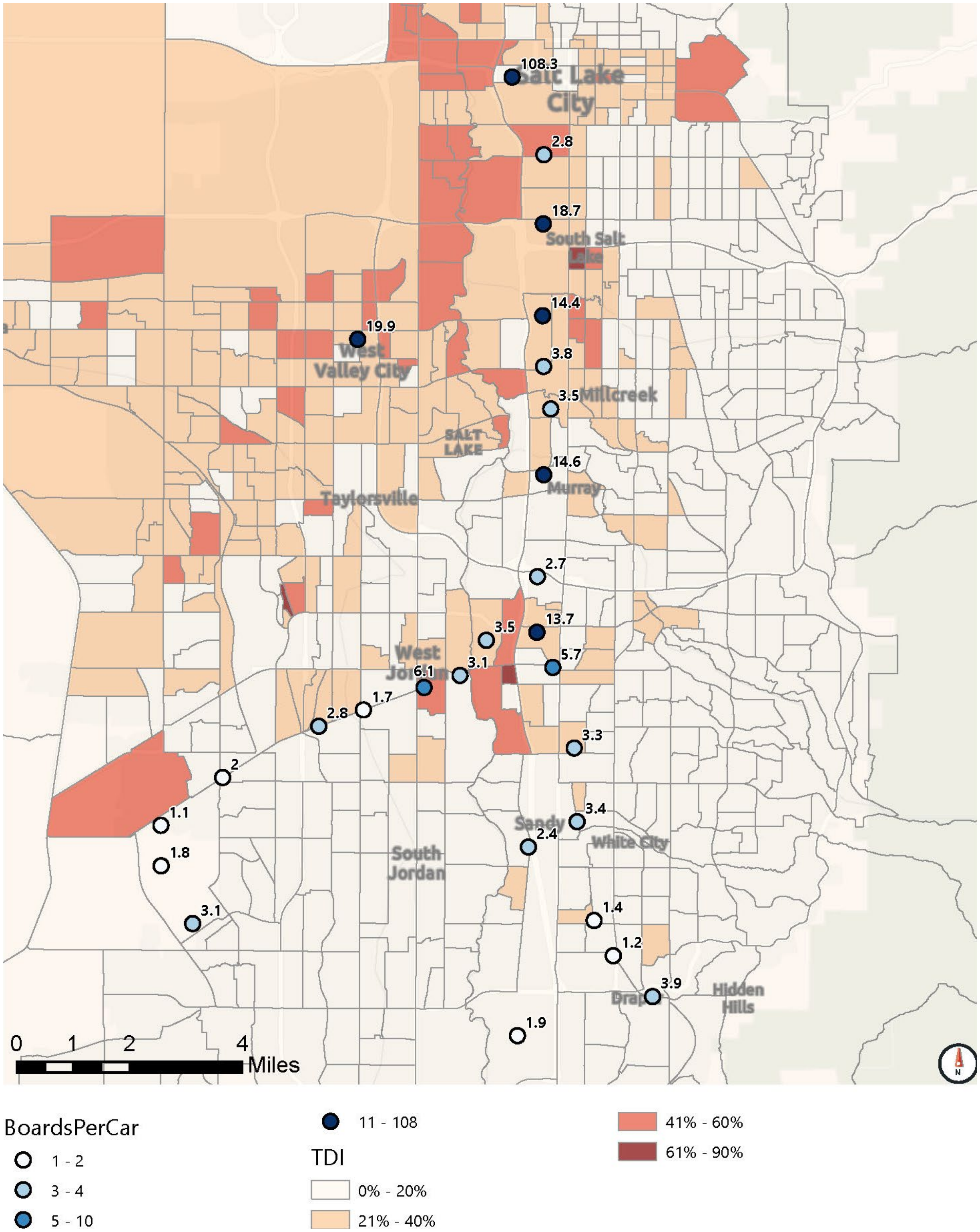


Figure 10 – Transit, Bike, and Walk Scores

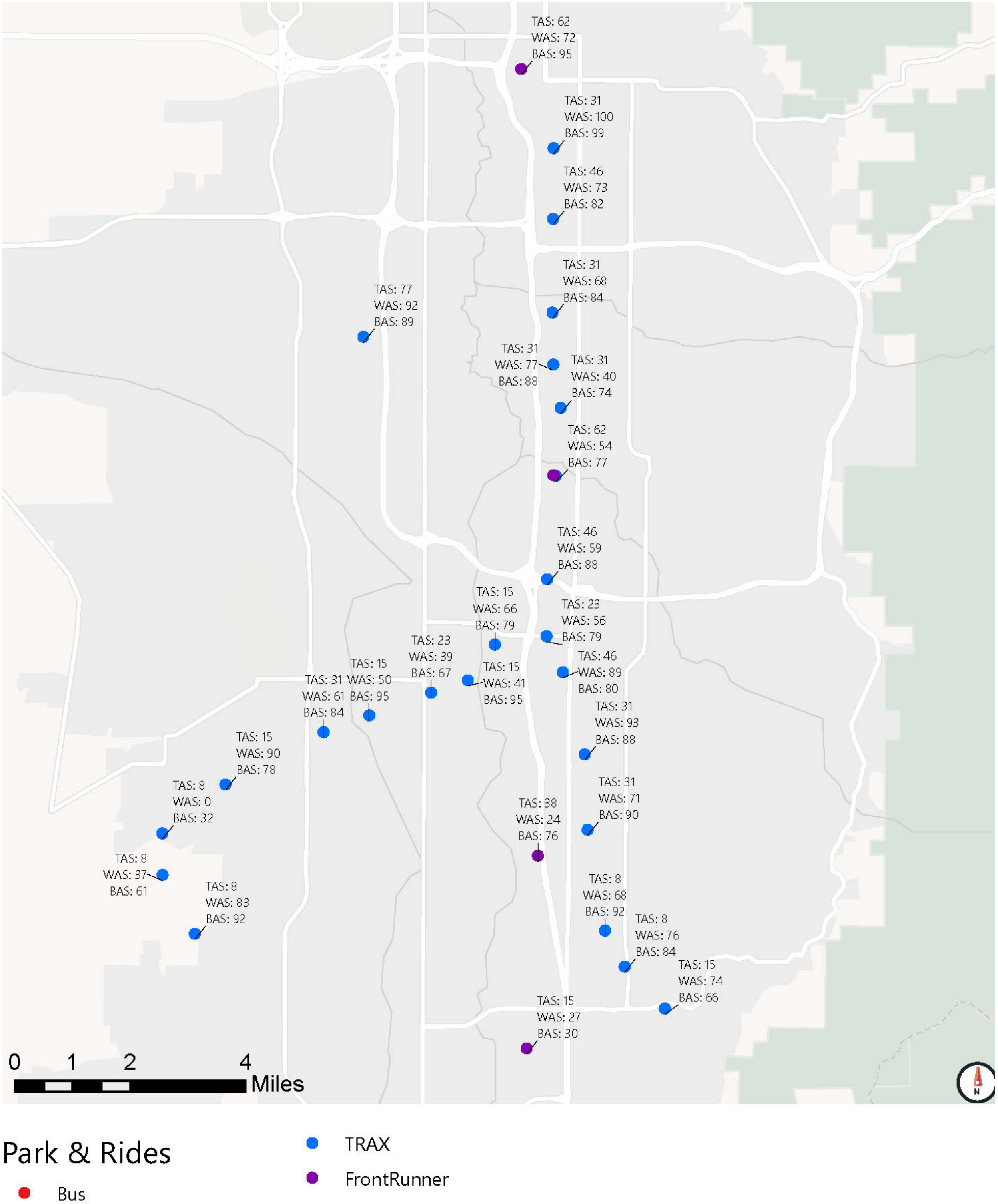


Figure 11 – Location Regional Destinations Near Park & Ride Facilities

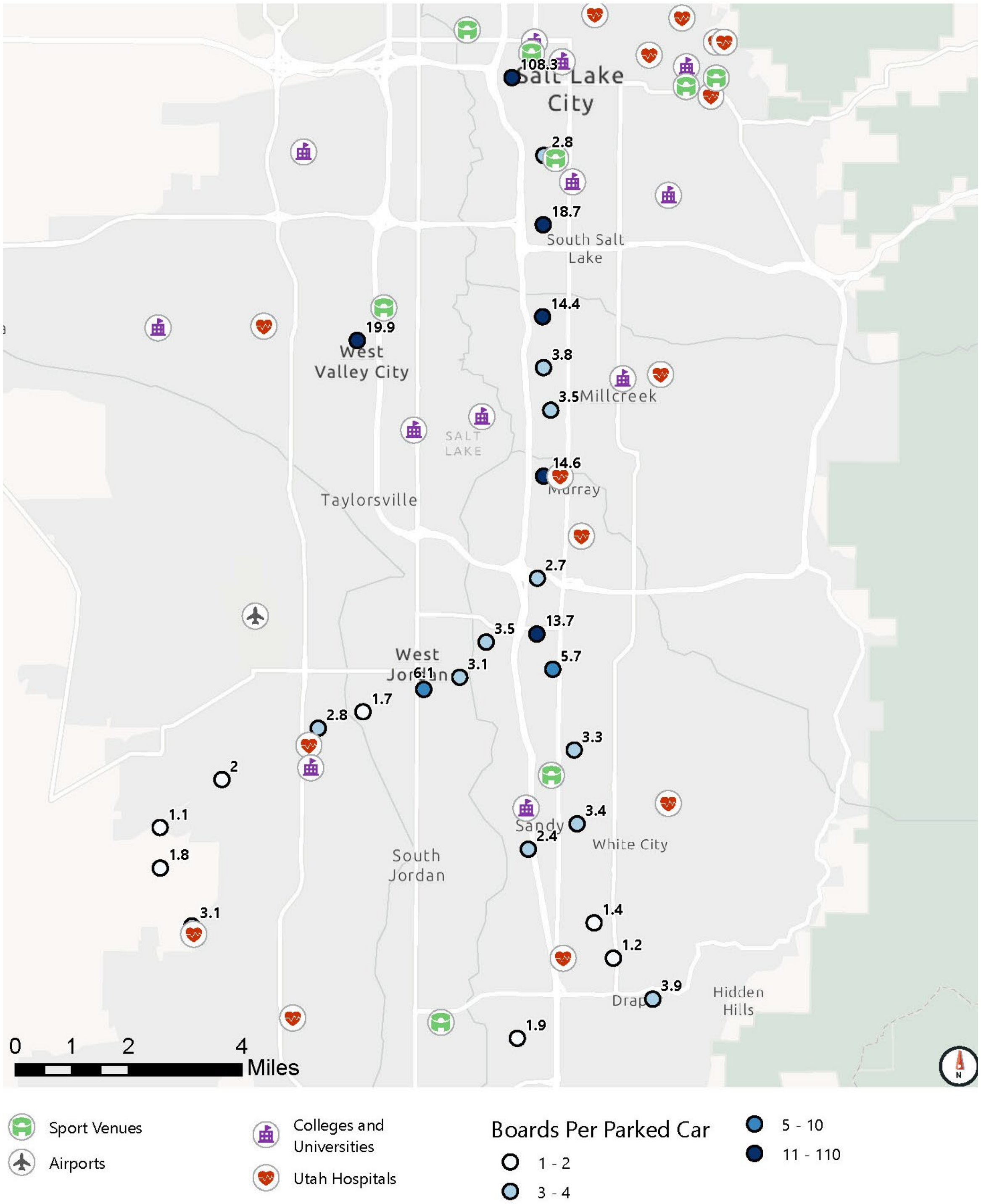


Table 1 shows a summary of various elements mapped, their connection with established goals and objectives, along with definitions and criteria used split them into low, medium or high levels, as applicable or relevant.

Table 1 – Summary of Land-use, Demographic, and Infrastructure Elements

Category	Metrics	Goals & Objectives	Metrics	Criteria/Definitions
Land Use	**Development Density, Zoning**	Right-size Parking	• Compactness of development or lack thereof • Density of roadway network • Diversity of uses • Develop scale (high-rise vs mid-rise vs low-rise) • Primary type of uses	• **Urban –** High density, diverse mix of uses, compact development, dense roadway connectivity • **Emerging Urban** – Fairly compact development, low-mid-rise buildings, some diversity in uses, fairly connected roadway network • **Suburban** – low rise development, low roadway connectivity, consolidated land-use types • **Rural –** very low-density development**,** large lot sizes, poor roadway connectivity, agricultural or related uses
	Population Density	Right-size Parking	• Under 5,000/sq mi • 5,000 – 25,000/sq mi • 25,000 – 50,000/sq mi	• Low density indicates more sub-urban or rural locations. • Mid-level density indicates suburban or emerging-urban locations • High density indicates urban or CBD location
	Job Density	Right-size Parking	Jobs per sq mile • Under 10 • 11 – 50 • 51 – 100 • 101 – 250 • Above 250	• Low density indicates more sub-urban or rural locations. • Mid-level density indicates suburban or – local employment centers • High density indicates regional employment draw
Demographics	**Income**	Equity and Affordability	% of HH below Poverty Line • 0% - 10% - High income area • 11% - 25% - Medium income area • 26% - 50% - Low-income area • 51% - 75% - Very low-income area • 76% - 91% - Extremely low-income area	• Low, very-low, and extremely low-income population % indicates locations where providing and maintaining low cost connections to transit stations is priority to meet the equity and affordability objectives
	Vehicle Ownership	Incentivize Active Transportation Equity and Affordability	% of HH with no vehicles • Below 10% • 11% - 20% • 20% - 30% • 30% - 40% • Above 40%	High percentage of vehicle ownership areas indicate the need to improvement active transportation infrastructure and amenities to connect to the transit station
	Transit Dependency	Incentivize Active Transportation Equity and Affordability	Transit Dependency Index • Below 20% • 20% - 40% • 41% - 60% • Above 60%	Higher TDI indicates areas where people are dependent on transit to meet their daily travel needs. Improving access to transit and improving active transportation infrastructure will improve ridership.

Category	Metrics	Goals & Objectives	Metrics	Criteria/Definitions
Infrastructure	**Walk Shed, Walk score**	Incentivize Active Transportation Climate and Sustainability	Walk Score • Below 30 • 30 – 50 • 50 – 80 • Above 80	Higher walk-score indicates higher quality of pedestrian infrastructure. If combined with higher bike and transit access score, location will have a high multimodal access score
	Bike Shed, bike score	Incentivize Active Transportation Climate and Sustainability	Bike Score • Below 30 • 30 – 50 • 50 – 80 • Above 80	Higher bike-score indicates higher quality of bicycle infrastructure. If combined with higher walk and transit access score, location will have a high multimodal access score
	Transit Access score	Incentivize Active Transportation Climate and Sustainability	Transit Access Score • Below 30 • 30 – 50 • 50 – 80 • Above 80	Higher transit access score indicates higher quality of transit connections and reliability. If combined with higher walk and bike score, location will have a high multimodal access score

Typologies

The existing parking supply, utilization, and boardings data were analyzed in correlation with contextual land-use, demographics, and accessibility factors to develop typologies of park & ride facilities. Below is a summary of these typologies.

1. **Urban/Central Business District**: These facilities are strategically located in the urban central business districts and typically characterized by high-density employment zones, shopping districts, and cultural hubs.
2. **Emerging Urban**: These facilities serve areas which are experiencing rapid urbanization and growth and are continuing to evolve with increasing population and job density. The communities typically bridge the gap between suburban and fully developed urban regions.
3. **Existing or Potential Transit Oriented Development:** These facilities have all the contextual ingredients of a transit-oriented development with connection to other bus lines, mix of land-uses, population, jobs, and development densities conducive generating transit ridership without needing as much parking.
4. **Suburban Transfer Location**: These facilities are adjacent to stations that act as transfer points between bus lines and higher-capacity transit including light and heavy rails. Commuters from suburban locations without access to transit drive to these locations to continue their onward journeys on transit.
5. **Suburban Mid-Corridor**: These facilities are strategically located along major transportation corridors and typically serve the riders from the neighborhood communities. The neighborhoods predominantly include low-medium density residential and less favorable access to stations via active transportation modes, so automobiles are a primary way for riders to connect to the station.
6. **Suburban Terminus Location:** These are facilities that are located at the outskirts of the urban areas where transit lines end characterized by convergence of commuters from both urban and suburban areas and typically have large, dedicated parking facilities.

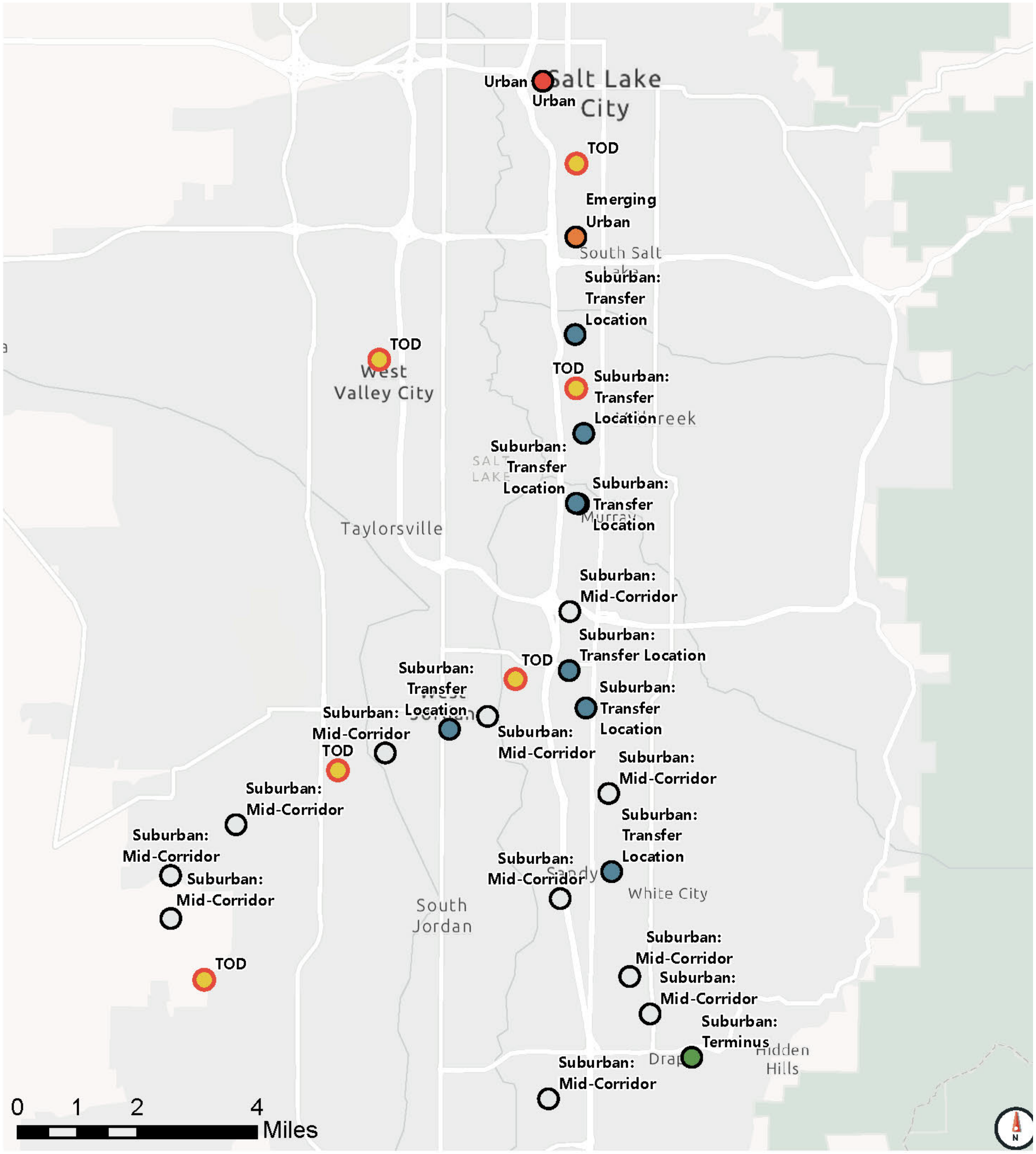
Table 2 summarizes a criteria matrix for each of the parking demand influencing factors analyzed in the previous section and their correlation to the six typologies selected to represent the various park & ride facilities maintained and operated by UTA.

Using this criteria matrix as a guide, each park & ride facility was categorized under one of the six typologies. Figures 12-1 through 12-3 show the selected typology for each existing park & ride facility in the system. Locations with all the ingredients for potential Transit-Oriented Development (TOD) are highlighted with a yellow circle.

Table 2 – Park & Ride Typology and Criteria Matrix

Typologies	Land-Use Context	Boardings/ parked car	Pop Density	Job Density	Veh/ HH	Transit Dependency Index	Walk Score	Bike Score	Transit Access Score
Urban/CBD	Very Urban/CBD, mid- and high-rise developments, high diversity of use	Above 50	Very High	Very High	Low/ Medium	Above 60	Above 70	Above 80	Above 30
Emerging Urban	Urban – Low/Mid Rise development, some diversity of uses	Above 25	High	High	Medium	Between 40-60	Above 60	Above 70	Above 25
TOD: Affordable Housing/ Regional Destination	Can be urban, emerging urban or sub-urban development context. Some diversity of uses	Above 15	Medium	Medium	Low/ Medium	Above 20	Above 70	Above 80	Above 30
Sub-urban: Transfer location	Low development density, with low diversity of uses	Above 5	Low	Medium/ Low	Medium	Above 20	Above 50	Above 70	Above 40
Suburban: Mid-Corridor	Low development density, mostly single uses	0 - 5	Low	Low	Medium/ High	0 - 40	Above 40	Above 40	0 - 20
Suburban: Terminus	Low development density, mostly single uses	0 - 5	Low	Low	Medium/ High	0 - 40	Above 30	Above 40	0 – 20

Figure 12 – 1: Park & Ride Typologies



Park & Rides Typology

- Emerging Urban
- Suburban: Mid-Corridor
- Suburban: Terminus
- Suburban: Transfer Location
- TOD
- Urban

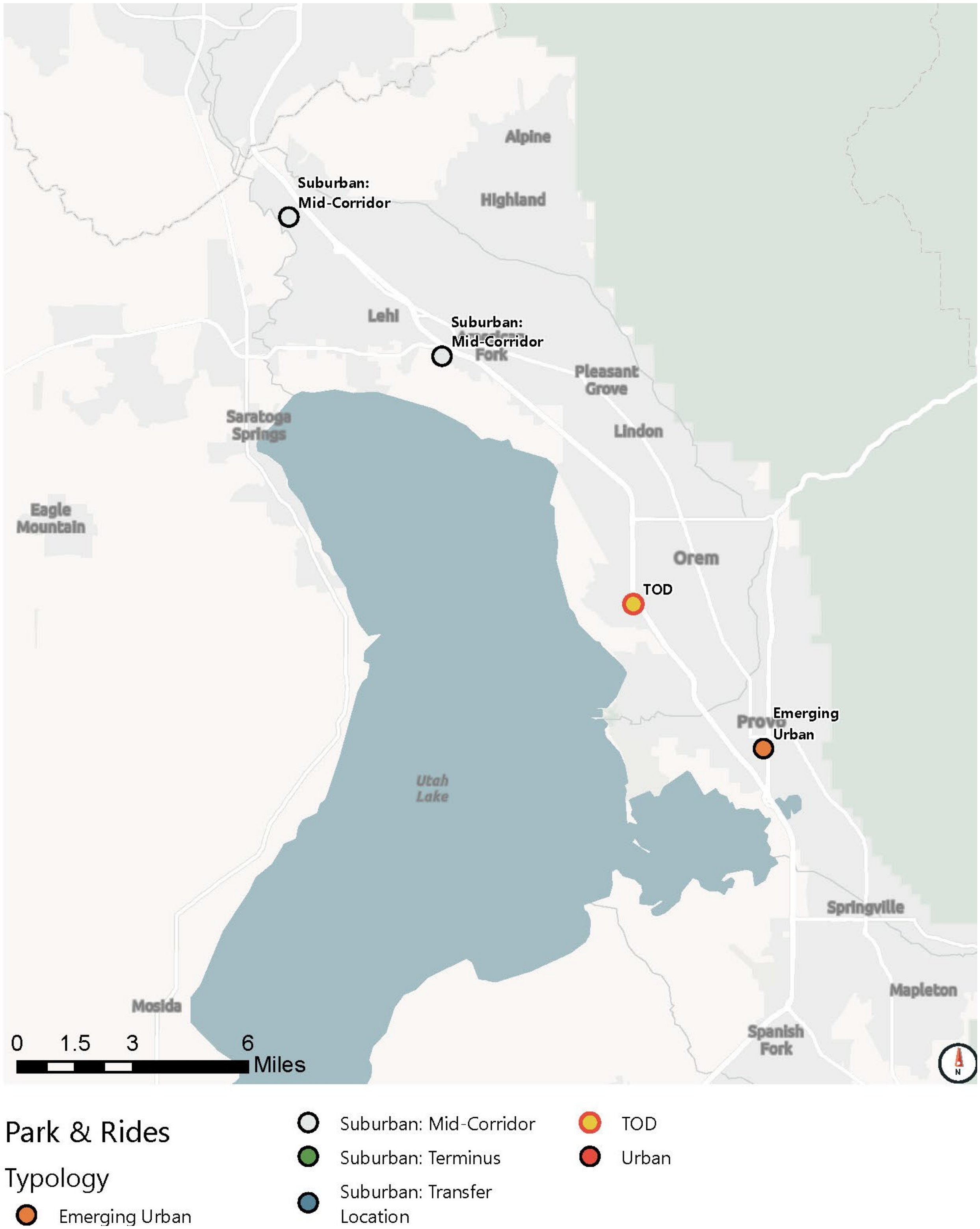
Figure 12 – 2: Park & Ride Typologies (Continued)

Park & Rides

Typology

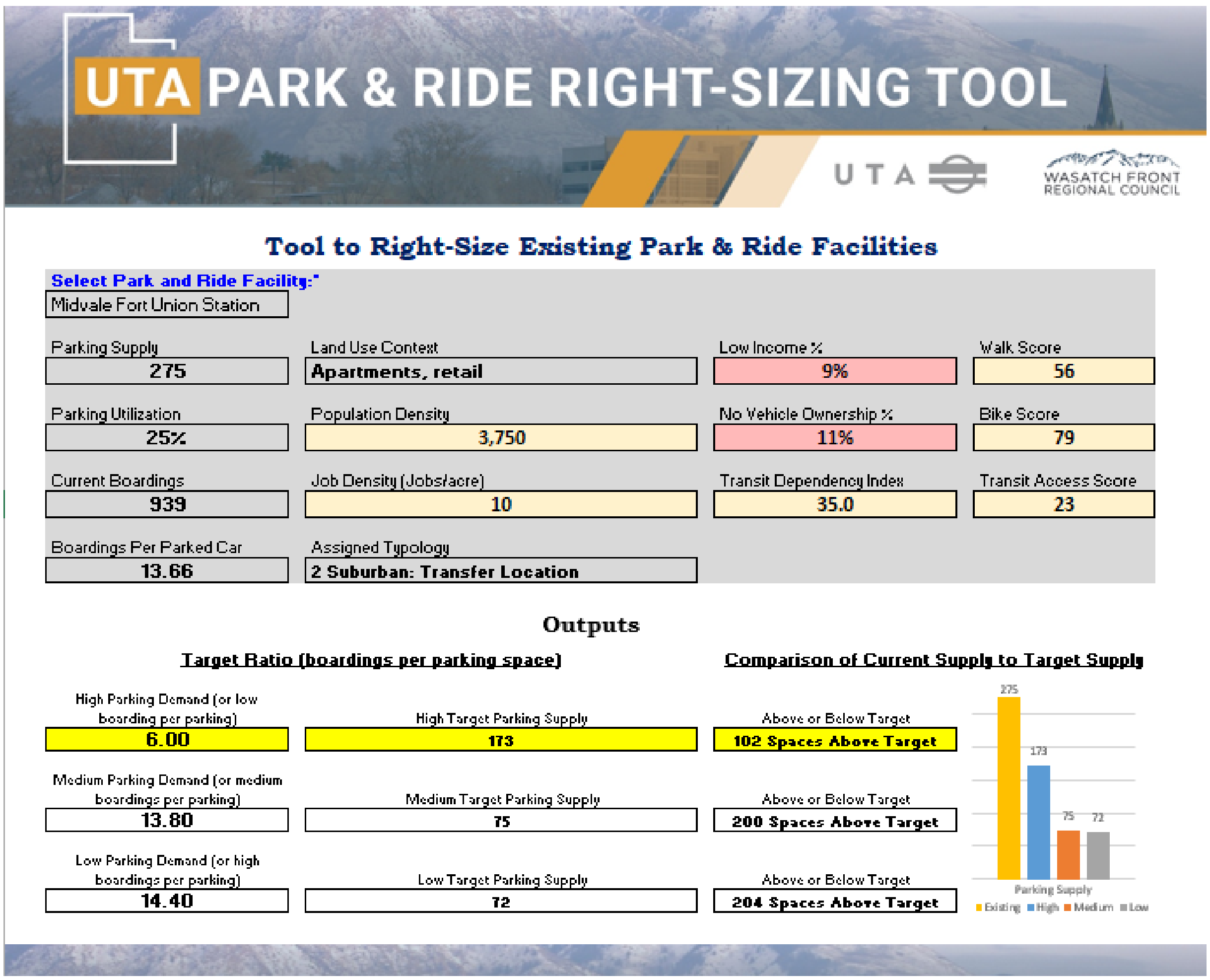
- Emerging Urban
- Suburban: Mid-Corridor
- Suburban: Terminus
- Suburban: Transfer Location
- TOD
- Urban

Figure 12 – 3: Park & Ride Typologies (Continued)



Right-Sizing Parking Tool

Using the typology criteria matrix and the data mapping and analysis described in the previous sections, a Microsoft Excel-based tool was developed. This tool allows users to review all contextual data associated with a park & ride facility, including its BPPC ratio. Based on this contextual information, the tool recommends right-sizing parking to either the 50th, 70th, or 85th percentile of supply ratios. A lower target ratio suggests that station ridership relies less on parking access, with more people using alternative means to reach the station. The tool also includes a provision for planning a new park & ride if similar contextual data, including projected boardings at the station, is available.



Provided below is detailed description of the tool, followed by a step-by-step user guide to use the tool.

Existing Park & Ride Right-Sizing

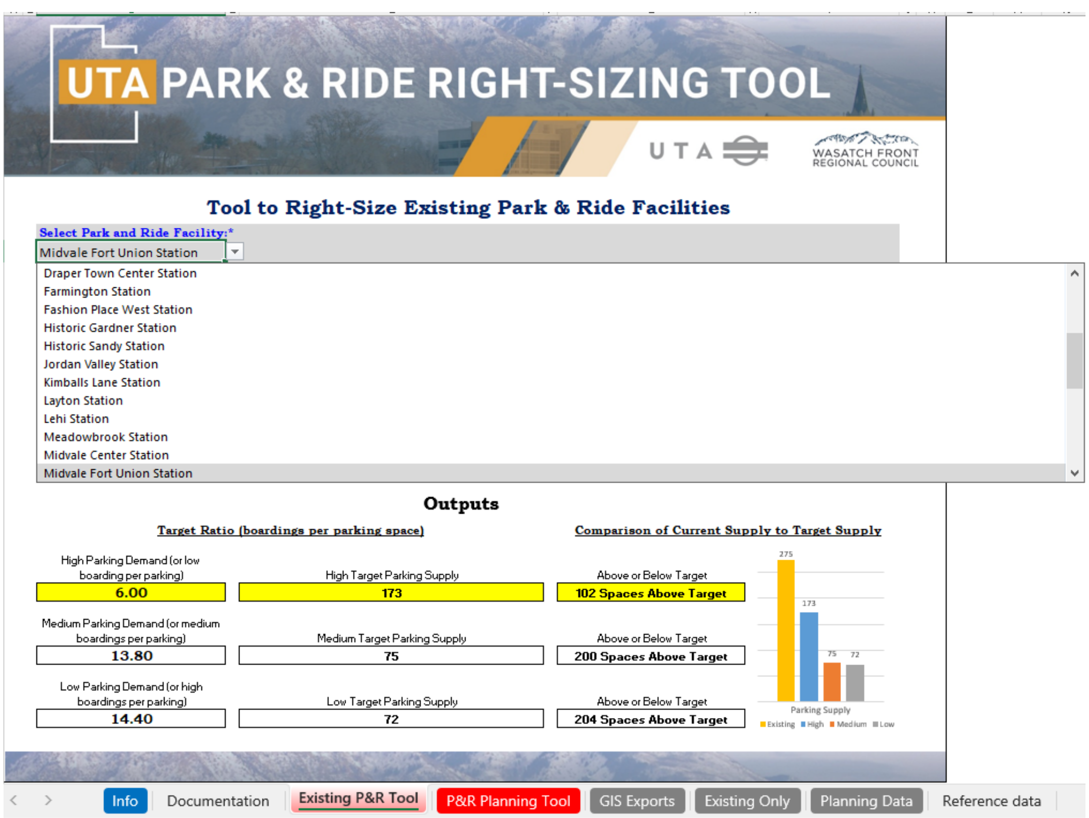
The primary input for the existing Park & Ride tool is selecting the station you want to analyze from a dropdown list. This selection auto-populates with station details such as parking supply, utilization, and demographic information like population density and walk access score. The "Existing P & R Tool" worksheet calculates the necessary parking capacity for a park & ride location based on its BPPC ratio, correlated with other contextual factors such as population density, employment, demographic characteristics, and accessibility scores. The tool evaluates specific locations based on how favorable they are for adjusting parking supply. The "high target ratio" represents the 50th percentile of all facilities, the "medium target ratio" the 70th percentile, and the "low target ratio" the 85th percentile. Each target ratio includes a 10% buffer or "cushion" in parking supply to account for inefficiencies, seasonal variations, and other factors.

The tool has been developed to allow easy updates as UTA and partner agencies update parking supply, utilization, and boardings data, and as new census data becomes available. This ensures the tool can provide recommendations using the most recent information available.

User Guide

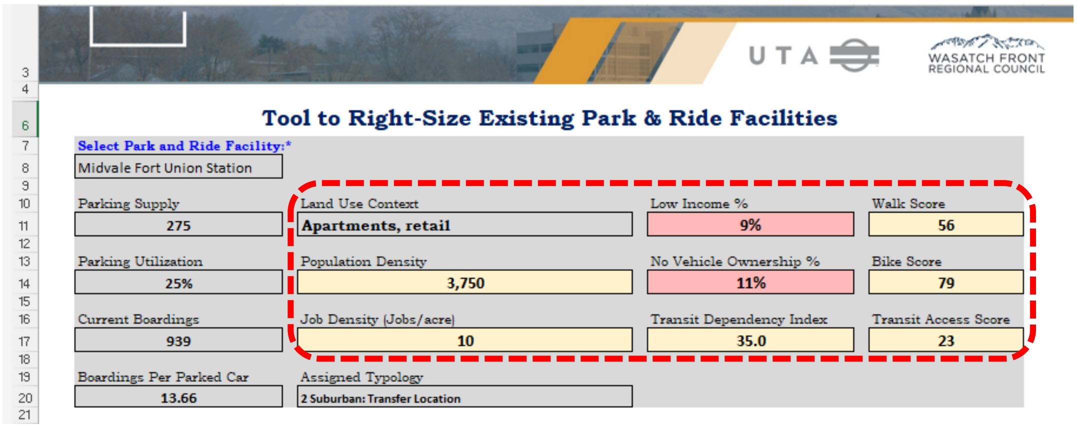
Step 1

Select the park & ride facility from dropdown.



Step 2

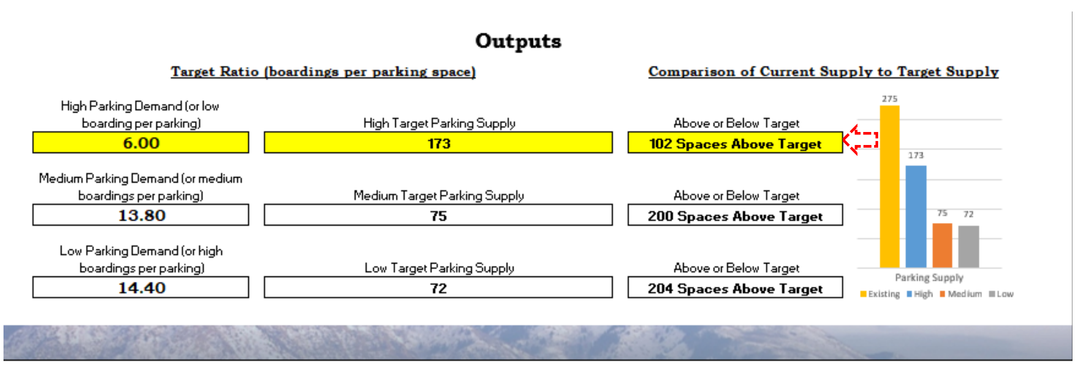
As soon as the facility is selected, the tool will populate ~~the~~ all information and data associated with the location and highlight the recommended target supply using the percentile criteria described above.



Land-use, demographic and accessibility factors are color coded in the tool where in factor with low favorability to reduce parking demand are shown in red, medium favorability with yellow, and high favorability with green. For this example, Midvale Fort Union Station, majority of the parking-demand influencing factors for the selected park & ride facility at had quantities or levels which were low to medium (shown in yellow and red) levels.

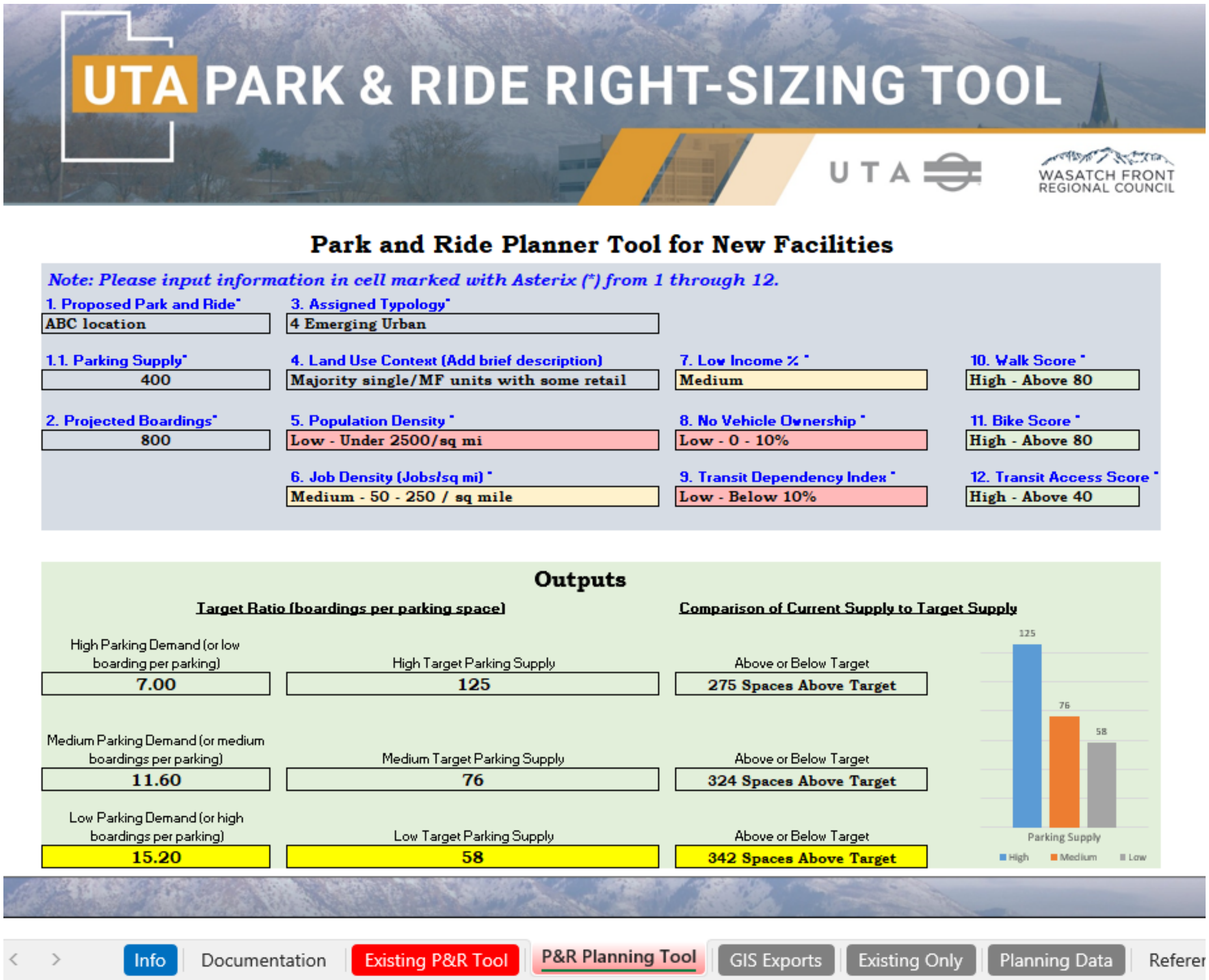
Step 3

As shown in the output, the tool recommended a high target parking supply ratio of 173 parking spaces. If the location were to improve its accessibility scores to green in future with investments in active transportation and transit connections to the station, the facility could improve its target parking supply from 173 spaces to as low as 72 spaces.



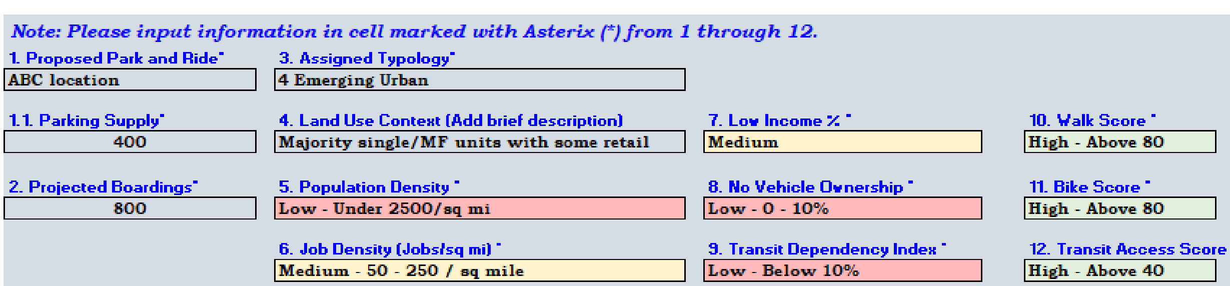
Planning Tool

"Planning tool" allows users input data for each of the contextual factors and projected boardings at a station to determine parking supply for a new park & ride facility. Similar to the existing Park & Ride option, the Low, Medium, and High target ratios reflect the parking needed based on contextual factors affecting demand. Provided below is a step-by-step guide to using this tool.



Steps 1 - 12

In the “Planning Tool” worksheet, add the following inputs. A user can click on the subtitles to see a brief definition or guidance for each of the inputs (1 – 12) discussed below.



1. Add name of the location

2. Add projected boardings

3. Assign typology of the location out of the 6 typologies discussed earlier

4. Add a small description of adjacent land-uses

5. Choose from drop down menu of population density within ½ mile radius of the planned facility. Three options are low, medium and high.

6. Choose from low, medium or high job density within ½ mile radius of the planned facility

7. Choose from low, medium or high concentration of low-income households within the ½ mile radius

8. Choose from low, medium, or high concentration of zero-car households within ½ mile radius

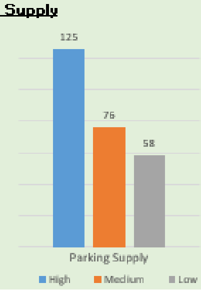
9. Choose from low, medium, or high transit dependency index.

10. through 12. Choose applicable walk, bike and transit access score. These are also defined in low, medium or high.

Once the above inputs have been made to the tool, the tool will now be able to recommend target parking supply based on the project boarding, and contextual factors influencing parking demand within the typology.

Outputs

Target Ratio (boardings per parking space)		Comparison of Current Supply to Target Supply
High Parking Demand (or low boarding per parking)	High Target Parking Supply	Above or Below Target
7.00	125	275 Spaces Above Target
Medium Parking Demand (or medium boardings per parking)	Medium Target Parking Supply	Above or Below Target
11.60	76	324 Spaces Above Target
Low Parking Demand (or high boardings per parking)	Low Target Parking Supply	Above or Below Target
15.20	58	342 Spaces Above Target



As shown above, this location is recommended with a low target parking supply ratio of 58 spaces.

The tool includes definitions, method of calculation, existing and reference data included in separate worksheets within the tool.