



Airport Transit Connection Concept Evaluation Study

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Acronyms and Abbreviations

ACRONYM/ABBREVIATION	DEFINITION
ABM	Activity Based Model
ACA	Airport Connectivity Analysis
ADT	average daily traffic
ATC	Airport Transit Connector
CCC	California Coastal Commission
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CMH	Central Mobility Hub
CO₂	carbon dioxide
CONRAC	Consolidated Rental Car Center
CPUC	California Public Utilities Commission
DAR	direct access ramp
EMFAC	Emission Factors
FAA	Federal Aviation Administration
FRA	Federal Railroad Administration
GHG	greenhouse gases
LOSSAN	Los Angeles–San Diego–San Luis Obispo Rail Corridor
LRT	light rail transit
MTS	Metropolitan Transit System
NCTD	North County Transit District
NEPA	National Environmental Policy Act
NOP	Notice of Preparation
O&M	operations and maintenance
OMSF	Operations, Maintenance and Storage Facility
OTTC	Old Town Transit Center
PTC	Port Transit Center
RPZ	Runway Protection Zone
SANDAG	San Diego Association of Governments
SDIA	San Diego International Airport
Study	Concept Evaluation Study
TBM	tunnel boring machine
Trolley	San Diego Trolley

ACRONYM/ABBREVIATION	DEFINITION
USFWS	United States Fish and Wildlife Service
VMT	vehicle miles traveled

Terms and Definitions

TERM	DEFINITION
Active Fault	A fault that has had surface displacement within Holocene time, about the last 11,000 years.
Aerial	The location of a structure or transit guideway elevated above the ground level.
Airport Transit Connector	A transit airport connection using automated people mover technology.
Arterial	A high-capacity road that carries longer-distance flows between important centers of activity.
At-grade	The location of a transit guideway at the same level as the ground surface.
Automated People Mover	An automated guideway passenger transit system mainly used to serve airports and downtown districts.
Average Daily Traffic	The total traffic volume during a stated period divided by the number of days in that stated period.
Bored Tunnel	A bored tunnel is constructed using a tunnel boring machine that digs or bores a circular tube-like passage below ground.
Collector	A low-to-moderate-capacity road that moves traffic from local streets to arterial roads.
Cut-and-Cover Tunnel	A cut-and-cover tunnel involves the digging of a trench, the construction of a tunnel, and then returning the surface to its original state.
Dedicated Right-of-Way	Right-of-way reserved for the exclusive use of a particular mode of transportation.
Greenhouse Gas	A gas that absorbs and emits radiant infrared energy, causing a greenhouse effect. The primary GHGs in Earth's atmosphere are carbon dioxide (CO ₂), methane (CH ₄), nitrous oxide (N ₂ O), and ozone (O ₃).
Headway	The amount of time between transit vehicle arrivals at a stop.
Interline	To combine two or more independent routes along a section of transit guideway.
Lateral Spread	A liquefaction-related phenomenon in gently sloping areas or areas having a free-face condition, such as the slope of a riverbank. Lateral spread horizontally displaces large masses of soil, often as intact or broken-up blocks, because of earthquake-induced liquefaction.
Liquefaction	Liquefaction occurs when loosely packed sandy or silty materials saturated with water are shaken hard enough to lose strength and stiffness, resulting in soil behaving like a liquid.
Logical Termini	Logical termini are defined as the rational beginning and end points for a transportation project.
Major Road	A road designed for through-traffic but typically has signals at major intersections.

TERM	DEFINITION
Major Utilities	Major Utilities are categorized as water facilities equal to or greater than 16 inches, sewer facilities equal to or greater than 18 inches, and storm drain facilities equal to or greater than 36 inches.
Project Area	The cumulative station area that includes the 0.5-mile straight-line buffer from all proposed stations for a given concept.
Runway Protection Zone	A trapezoidal area at ground level extending from the end of an airport runway with the purpose of providing a safe, clear space for aircraft takeoffs and approaches, and to protect people and property on the ground.
Shoofly Track	A temporary track used to avoid an obstacle that blocks movement on the main track.
Siding Track	A short, low-speed track section distinct from the main line used to enable trains on the same line to pass.
Station Area	The 0.5-mile straight-line buffer around a station.
Vehicle Miles Traveled	A measure of the amount of travel for all vehicles in a geographic region typically over a one-year period. VMT is calculated as the sum of the number of miles traveled by each vehicle.
Wayfinding	Wayfinding includes signs or other graphics used to convey location and directions to travelers.

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1. EXECUTIVE SUMMARY

1.1. Introduction and Background

The San Diego International Airport (SDIA) is the busiest single-runway airport in the nation and has established itself as a major economic engine for the region. SDIA is currently modernizing its facilities to accommodate an anticipated increase of 16 million annual passengers by 2050, which will total an estimated 40 million passengers annually. Because roads surrounding the airport are constrained, SDIA is working to make the airport roadways easier for traffic to enter and exit, as well as making a number of off-site transportation improvements in and around the airport. For this reason and others explored in this study, connecting transit to SDIA has grown from a decades-long regional goal to an urgent priority in order to keep up with the needs of local residents and tourists traveling to and from the airport.

Given the anticipated passenger growth projections, as well as additional development anticipated by the Port of San Diego and within the region at large, elected officials and public agencies across the region determined that it is time to provide a world-class transit system that will offer passengers and visitors a direct, convenient, more environmentally friendly way to avoid traffic and connect to the airport. To advance this goal, the San Diego Association of Governments (SANDAG) convened the Airport Connectivity Subcommittee in 2018 to study future transportation solutions for improved transit and road connectivity to SDIA.

This SANDAG subcommittee was composed of a bipartisan group of elected leaders from around the region who worked in conjunction with the San Diego County Regional Airport Authority, the Port of San Diego, and other relevant agencies. The subcommittee's resulting report—*Airport Connectivity Analysis* (SANDAG 2019)¹—contained recommendations and considerations that SANDAG leadership has advanced through careful, collaborative analysis since that time. In addition, the region has assembled an unprecedented commitment from local agencies to work together to develop a world-class transportation connection to SDIA. In fact, the San Diego County Regional Airport Authority has collaborated with SANDAG to preserve a “transit-ready” area and announced a new 10-year airline operating and lease agreement with its airlines that financially supports the redevelopment of Terminal 1, with the potential of funding for eligible airport-related transportation projects, provided that other regional funding could be secured. Establishment of a direct connection from the regional transit system to SDIA is also identified in *San Diego Forward: The 2021 Regional Plan*.

Among the recommendations included in the *Airport Connectivity Analysis* is the development of a Central Mobility Hub (CMH) with an Airport Transit Connector (ATC) linking SDIA to the regional transit system. In September 2019, the SANDAG Board of Directors (Board) allocated \$40 million to support preliminary environmental analysis, planning, and engineering for a regional transit solution for the airport, including the option of a CMH and ATC. In May 2022, SANDAG leadership provided an update to the Board on the progress of its efforts with respect

¹ SANDAG. 2019. *Airport Connectivity Analysis*:
https://www.sandag.org/uploads/projectid/projectid_577_26642.pdf

to development of a CMH and an ATC. The Board expressed a desire to further understand the different alternative concepts under consideration, including ATC, Trolley, and bus concepts, which led to this Concept Evaluation Study (study).

1.2. Purpose and Objectives of Study

Following extensive planning and stakeholder coordination, along with feedback from the Board, SANDAG has undertaken this study to develop a variety of concepts to create a regional transit connection to SDIA as part of the CMH Project.

The purpose of this study is to evaluate the concepts under consideration to provide a direct transit connection to SDIA, considering logical station termini and modes of transit. These concepts consist of several potential routes and three key transportation modes: an ATC², extension of the San Diego Trolley (Trolley), and enhanced bus service.

In support of this study, criteria based upon those used in the *Airport Connectivity Analysis* (SANDAG 2019) were developed to evaluate and compare the concepts quantitatively and qualitatively (the criteria are included in Table 1-2).

1.3. Airport Connection Concepts

1.3.1. Overview

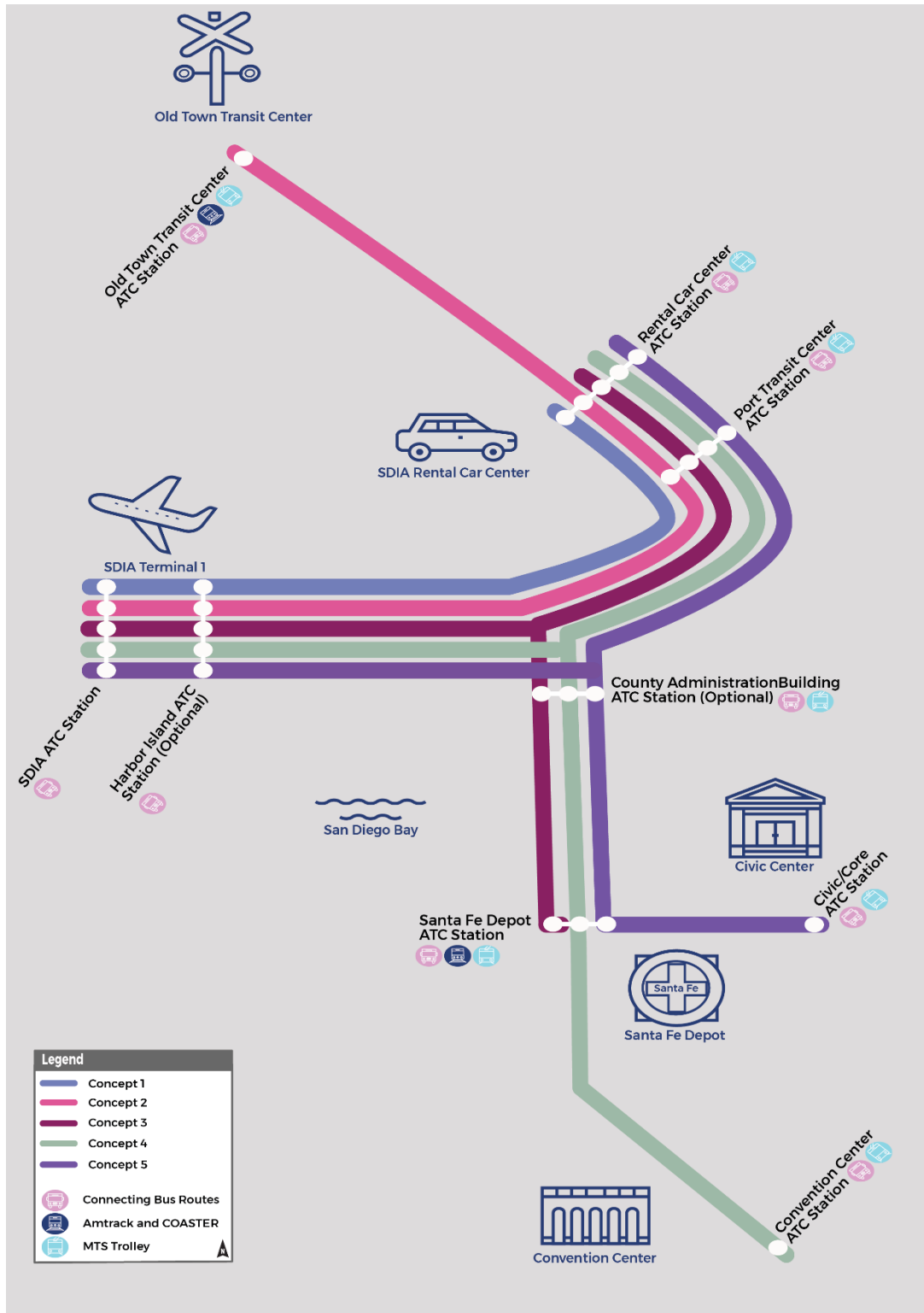
Three transportation modes were considered for a direct transit connection to the airport:

- (1) An ATC using an automated people mover system
- (2) An extension of the Trolley light rail transit (LRT) system
- (3) Enhanced bus service

Seven concepts were evaluated in this study. For the five ATC concepts involving an automated people mover system, transit connections to the north and/or south of SDIA were evaluated with variations of stops, termini, configurations, and features. These five ATC concepts include two north-route-only concepts and three concepts with north and south routes combined (with additional variations and features discussed in this study). These concepts are illustrated in Figure 1-1.

² For the purposes of this study, the term Airport Transit Connector is synonymous with automated people mover technology. The study acknowledges that the Trolley and bus are also transit concepts connecting to SDIA.

Figure 1-1. Conceptual ATC Alignments and Stations



Source: WSP and HDR 2023

In addition to the five ATC concepts, one concept was studied for the Trolley mode and one concept was studied for the enhanced bus mode. All concepts are summarized in Table 1-1. Each concept evaluated is described in more detail in Chapter 3.

Table 1-1. Concepts Included in this Study

MODE	CONCEPT	POTENTIAL FEATURES/VARIATIONS	
ATC	North Route Only ¹	Concept 1 SDIA to CONRAC/PTC	Concept 1A: SDIA to CONRAC/PTC Concept 1B: Concept 1A + DAR to/from I-5 Concept 1C: Concept 1A + LOSSAN (COASTER and/or Surfliner) Platform
		Concept 2: SDIA to OTTC	N/A
	North and South Routes Combined	Concept 3: SDIA to PTC/CONRAC and Santa Fe Depot	Concept A: Aerial Concept B: Bored Tunnel Concept C: Hybrid (aerial and bored tunnel)
		Concept 4: SDIA to PTC/CONRAC and Convention Center	
		Concept 5: SDIA to PTC/CONRAC and Civic Center	
Trolley	Concept 6: SDIA to 12th & Imperial Transit Center	N/A	
Enhanced Bus	Concept 7: Route from SDIA to OTTC and Route from SDIA to Santa Fe Depot and City College	N/A	

Source: SANDAG 2022

Notes: ¹For the ATC concepts, the study started with the assumption that a north route was necessary in any configuration to accommodate potential locations for a required vehicle maintenance and storage facility. For this reason, a full evaluation of south-route-only concepts is not included in this study, although some initial assessment was performed on a south-route-only configuration of Concept 5 (SDIA to Civic Center), which is provided in Appendix S. However, SANDAG plans to evaluate additional options to accommodate the vehicle maintenance and storage facility, and conduct further analysis of phasing the ATC concepts, including starting with a south-route-only option.

ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; DAR = direct access ramp; LOSSAN = Los Angeles–San Diego–San Luis Obispo Rail Corridor; N/A = not applicable; OTTC = Old Town Transit Center; PTC = Port Transit Center; SDIA = San Diego International Airport

As described in Chapter 2, the purpose of this study is to develop and evaluate the leading concepts to create a regional transit connection to SDIA. This study is not intended to determine the final alternatives that will advance to the environmental clearance process. Therefore, other variations of the concepts included in this study, including an ATC south-route-only concept, could be identified and advanced for consideration as part of the future environmental clearance phase.

The following subsections provide an overview of the ATC (Concepts 1-5), Trolley (Concept 6), and enhanced bus (Concept 7).

1.3.2. Concepts 1, 2, 3, 4, and 5: Airport Transit Connector

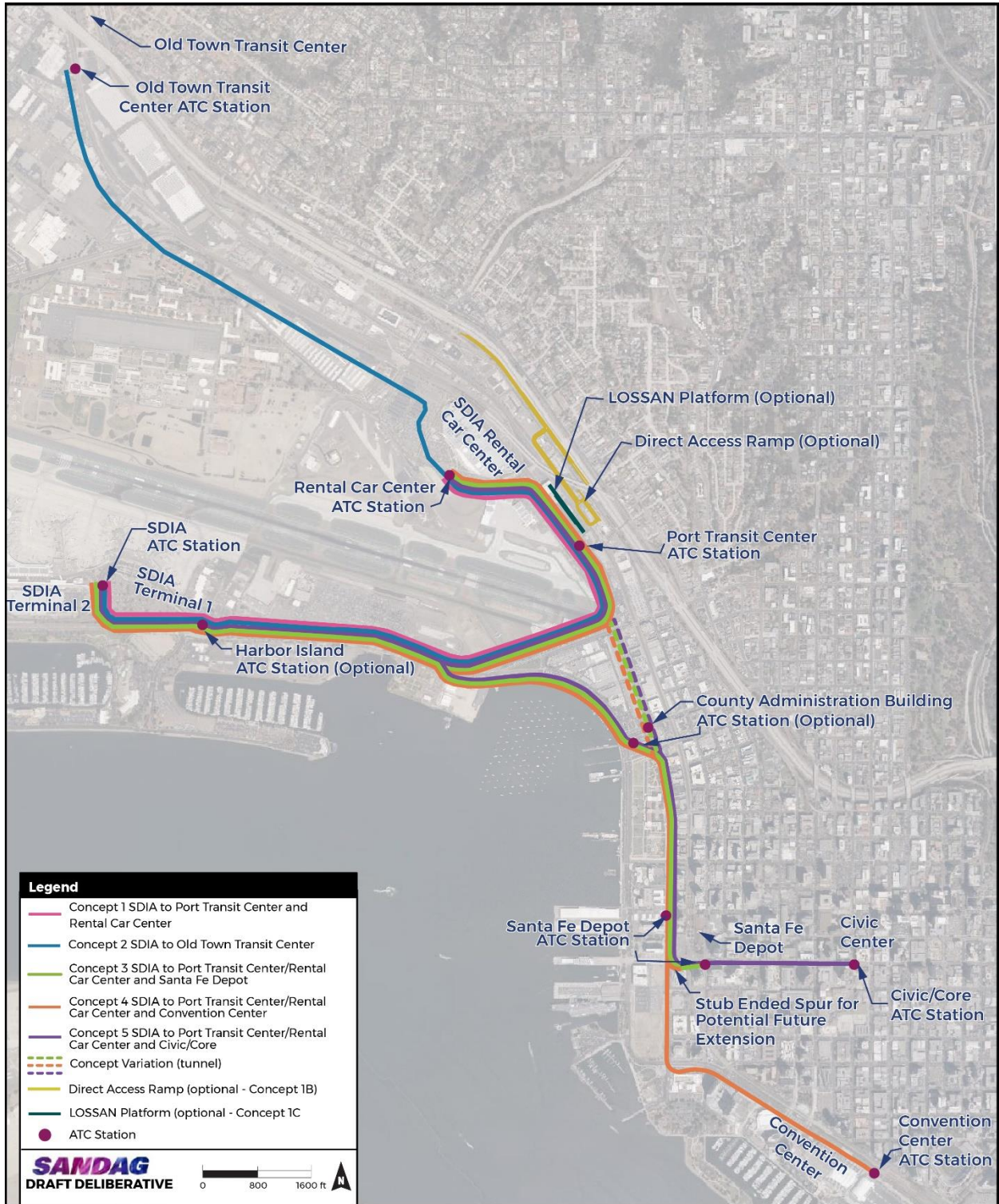
Each of the ATC concepts (Concepts 1 through 5) feature a high-frequency alignment in dedicated right-of-way. The following is a summary:

Looking at the two north-route-only concepts (Concepts 1 and 2), Concept 1A would extend 2.4 miles from SDIA and include two new ATC stations: at a future Port Transit Center (PTC) located at the current Port of San Diego Headquarters on Pacific Highway near the Middletown Trolley Station, and at the existing Consolidated Rental Car Center (CONRAC) near the intersection of Pacific Highway and Sassafras Street. This concept also includes an optional station at Harbor Island on Harbor Drive. The alignment would be a combination of aerial, at-grade, and tunnel configurations, depending on location. Concept 1B and Concept 1C include all parts of Concept 1A while adding additional features and variations, as described in Table 1-1. Concept 2 would extend 4.1 miles from SDIA to the CONRAC (without a stop at the current Port of San Diego Headquarters) and then to the Old Town Transit Center (OTTC). Concept 2 also includes an optional station at Harbor Island. Concept 2 would not include a PTC.

Looking at the combined north and south route concepts, Concepts 3, 4, and 5 would extend from SDIA to a southern terminus at a Santa Fe Depot ATC Station (Concept 3), Convention Center ATC Station (Concept 4), or Civic/Core ATC Station (Concept 5). Concepts 3, 4, and 5 each include a variation for an aerial (Concepts 3A, 4A, and 5A), bored tunnel (Concepts 3B, 4B, and 5B), or hybrid (aerial transitioning to a tunnel) (Concepts 3C, 4C, and 5C) alignment. The south route could interline with a north route and provide connections to SDIA and an optional Harbor Island Station without requiring a transfer. For comparison purposes throughout this study, the combined north and south routes (Concept 3, 4, and 5) use Concept 1A as the “baseline” north route. In other words, for the purposes of this study, Concepts 3, 4, and 5 all have the same north route (Concept 1A) but have different south routes (to the Santa Fe Depot, Convention Center, and Civic/Core, respectively). Concept 1A was selected as the common north route for the combined north and south concepts (Concepts 3 through 5).

Advancing a south route for implementation is responsive to community and stakeholder feedback, which expressed the desire for prioritizing an equitable and convenient transit connection to the airport for South Bay travelers, as well as a direct connection to the downtown core and its dense supply of housing, jobs, existing transit riders, and tourist destinations. As such, while ATC Concepts 3, 4, and 5 in this study include both a north and south route, each route could also be advanced independently. A south route would connect to existing and planned transit facilities in the region’s urban core. For purposes of a high-level screening, an initial evaluation was performed on a south-route-only configuration of Concept 5. Appendix S presents the summary of the evaluation for a south-route-only concept from SDIA to the Civic/Core. A two-route project or a project with only a north or a south route could be advanced for future consideration based on additional analysis, stakeholder input, and Board feedback. The ATC concepts are shown in Figure 1-2 and described in Chapter 3.

Figure 1-2. ATC Concepts



Source: WSP and HDR 2023

1.3.3. Concept 6: Trolley Concept from SDIA to 12th & Imperial Transit Center

Concept 6 would feature an extension of the Trolley LRT system. The route would begin at the 12th & Imperial Transit Center and use the existing Green Line tracks to Santa Fe Depot and then use the existing Blue and Green Line tracks to a location near Hawthorn Street. The LRT alignment would then branch off the existing Trolley tracks and be in an underground or aerial configuration to SDIA. A new station would be provided at SDIA, and an optional station could be provided at Harbor Island. This concept would provide access to the existing Trolley stations at County Center/Little Italy, Santa Fe Depot, Seaport Village, Convention Center, and Gaslamp Quarter before terminating at the 12th & Imperial Transit Center (Figure 1-3).

Figure 1-3. Concept 6 Trolley Concept



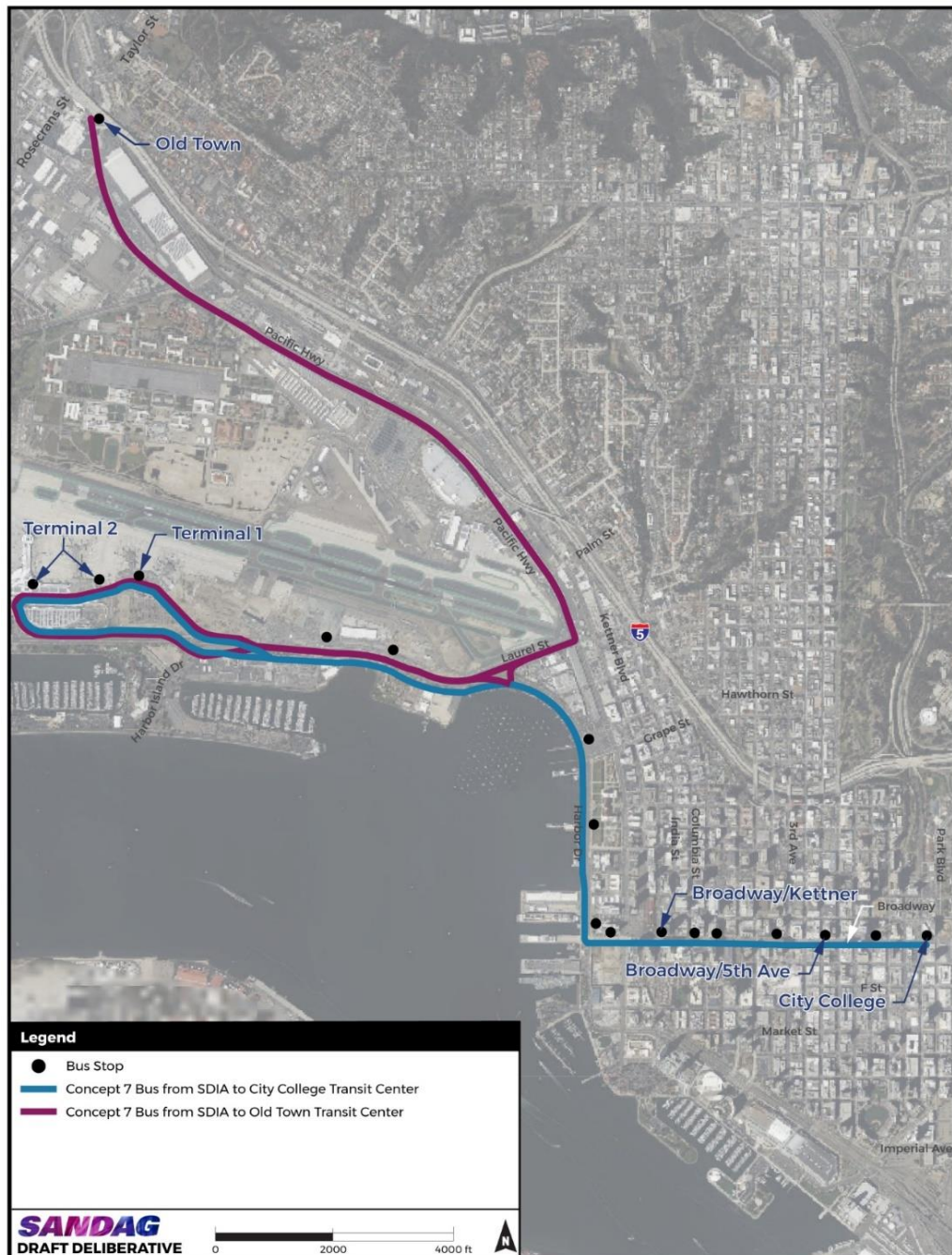
Source: WSP and HDR 2023

1.3.4. Concept 7: Bus Concept – Enhanced (Reduced Headway Times) Bus Service from SDIA to Old Town Transit Center and Santa Fe Depot

Concept 7 would consist of two routes: one from SDIA to Santa Fe Depot and City College and the second from SDIA to the OTTC (Figure 1-4). The Concept 7 route to City College would provide enhanced service of the MTS Route 992. This route would operate in a dedicated transit-only lane from the SDIA entrance as the route continues east, then south along Harbor Drive, and in a designated transit lane along Broadway. The route to OTTC would follow a similar route as the current San Diego Flyer operated by SDIA, and would travel in a dedicated transit-only lane along Harbor Drive, in mixed traffic along Laurel Street, and in a dedicated transit-only lane on Pacific Highway.

A full evaluation was completed for each concept and is included in the appendix that corresponds to that concept.

Figure 1-4. Concept 7 Bus Concept



Source: WSP and HDR 2023

1.4. Evaluation Criteria

The criteria used for the evaluation of concepts in this study are grouped into six key categories, consistent with the *Airport Connectivity Analysis*, and were presented to the Board on July 22, 2022. Each category consists of one or more criteria that were developed to better assess and compare the concepts, as outlined in Table 1-2.

Table 1-2. Evaluation Criteria

CATEGORY	CRITERIA
Passenger Convenience and Ridership	<ul style="list-style-type: none"> ▫ Regional connectivity ▫ User experience ▫ Travel time ▫ Ridership
Congestion of Airport Access	<ul style="list-style-type: none"> ▫ Traffic effects
Greenhouse Gases and Vehicle Miles Traveled	<ul style="list-style-type: none"> ▫ Changes in vehicle miles traveled and potential greenhouse gas reduction
Feasibility/Complexity	<ul style="list-style-type: none"> ▫ Right-of-way impacts ▫ Major utility impacts ▫ Construction effects and constructability ▫ Geotechnical and seismic conditions ▫ Regulatory considerations
Cost	<ul style="list-style-type: none"> ▫ Capital cost ▫ Cost per rider ▫ Cost per mile ▫ Operations and maintenance costs
Community Effects and Economic Benefits	<ul style="list-style-type: none"> ▫ Community effects ▫ Adjacent development considerations

Source: WSP, HDR, GPM, and TAHA 2022

1.5. Summary of Outcomes

Table 1-3 provides a quantitative summary of the evaluation of the three transportation modes — ATC (Concept 3, 4, and 5), Trolley (Concept 6), and bus (Concept 7). For purposes of this analysis, the evaluation is summarized for the ATC concepts that include both a north and south route. The evaluation of the combined north and south routes (Concept 3, 4, and 5) is inclusive of Concept 1A as the “baseline” north route. Therefore, Concepts 1 and 2 are not included in Table 1-3 or the evaluation in Section 5. The evaluation of criteria for the standalone north route ATC concepts (Concepts 1 and 2) described in Section 3.1 is provided in Appendices A through D. SANDAG recognizes that additional analysis and refinement of the concepts may be necessary prior to proceeding with the environmental clearance process.

Table 1-3. Evaluation of Airport Connectivity Concepts

CRITERION	PASSENGER CONVENIENCE AND RIDERSHIP <i>Regional Connectivity, User Experience, Travel Time, Ridership¹</i>	CONGESTION OF AIRPORT ACCESS <i>Traffic Effects¹</i>	VMT AND GHG <i>Vehicle Miles Traveled and Greenhouse Gas Change¹</i>	FEASIBILITY / COMPLEXITY <i>Right-of-Way Construction Effects/Constructability, Utility Impacts, Geotechnical and Seismic Conditions, Regulatory Considerations</i>	COST <i>Capital Cost, Annualized Cost per Rider, Cost per Mile, Operations and Maintenance</i>	COMMUNITY EFFECTS AND ECONOMIC BENEFITS <i>Adjacent Development Considerations, Adjacent Community Effects</i>
<p>Concept 3A: Aerial Airport Transit Connector from San Diego International Airport to Port Transit Center/ Consolidated Rental Car Center and Santa Fe Depot</p>	<ul style="list-style-type: none"> ▫ Connections to 49 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Dedicated right-of-way ▫ 4-minute headway ▫ 3 to 24 minute transit travel time savings ▫ 46,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 8 out of 10 segments ▫ 26% reduction on Airport Terminal 1 and 2 Roadways ▫ 26% reduction on SDIA inbound access road ▫ 22% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 70,000 VMT reduction ▫ 0.47% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ 30 parcels affected ▫ Complex construction: at-grade, aerial, cut-and-cover tunnel activities ▫ Located within SDIA or RPZ ▫ 15 major utilities ▫ Medium risk for liquefaction, active faulting, upper soil layer competency ▫ Permitting/coordination: FAA, CCC, USFWS, CDFW, Airport Authority, CPUC, FRA 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$2.2 to \$3.4 billion ▫ Cost/Rider: ~\$4.57 to \$6.83 ▫ Cost/Mile: ~\$0.6 to \$0.9 billion ▫ High O&M costs: guideway infrastructure and energy consumption 	<ul style="list-style-type: none"> ▫ Serves 8 surrounding communities ▫ Population of 19,500 within 0.5-mile buffer of the stations ▫ Contains 9,900 households within 0.5-mile buffer of the stations ▫ Contains 49,000 jobs within 0.5-mile buffer of the stations
<p>Concept 3B: Bored Tunnel Airport Transit Connector from San Diego International Airport to Port Transit Center/ Consolidated Rental Car Center and Santa Fe Depot</p>	<ul style="list-style-type: none"> ▫ Connections to 44 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Dedicated right-of-way ▫ 4-minute headway ▫ 3 to 24 minute transit travel time savings ▫ 46,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 8 out of 10 segments ▫ 26% reduction on Airport Terminal 1 and 2 Roadways ▫ 26% reduction on SDIA inbound access road ▫ 22% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 70,000 VMT reduction ▫ 0.47% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ 36 parcels affected ▫ Complex construction: at-grade, aerial, cut-and-cover, bored tunnel activities ▫ Located within SDIA or RPZ ▫ 17 major utilities ▫ Low risk for liquefaction, active faulting, upper soil layer competency ▫ Permitting and coordination: FAA, CCC, USFWS, CDFW, Airport Authority, CPUC, FRA, OSHA 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$3.4 to \$5.3 billion ▫ Cost/Rider: ~\$6.12 to \$9.15 ▫ Cost/Mile: ~\$0.9 to \$1.4 billion ▫ High O&M costs: guideway infrastructure and energy consumption 	<ul style="list-style-type: none"> ▫ Serves 8 surrounding communities ▫ Population of 20,100 within 0.5-mile buffer of the stations ▫ Contains 10,300 households within 0.5-mile buffer of the stations ▫ Contains 50,200 jobs within 0.5-mile buffer of the stations
<p>Concept 3C: Hybrid Airport Transit Connector from San Diego International Airport to Port Transit Center/ Consolidated Rental Car Center and Santa Fe Depot</p>	<ul style="list-style-type: none"> ▫ Connections to 49 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Dedicated right-of-way ▫ 4-minute headway ▫ 3 to 24 minute transit travel time savings ▫ 46,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 8 out of 10 segments ▫ 26% reduction on Airport Terminal 1 and 2 Roadways ▫ 26% reduction on SDIA inbound access road ▫ 22% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 70,000 VMT reduction ▫ 0.47% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ 29 parcels affected ▫ Complex construction: at-grade, aerial, cut-and-cover tunnel activities ▫ Located within SDIA or RPZ ▫ 15 major utilities ▫ High risk for liquefaction, active faulting, upper soil layer competency ▫ Permitting and coordination with FAA, CCC, USFWS, CDFW, Airport Authority, CPUC, FRA 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$3.0 to \$4.6 billion ▫ Cost/Rider: ~\$5.60 to \$8.38 ▫ Cost/Mile: ~\$0.8 to \$1.2 billion ▫ High O&M costs: guideway infrastructure and energy consumption 	<ul style="list-style-type: none"> ▫ Serves 8 surrounding communities ▫ Population of 19,500 within 0.5-mile buffer of the stations ▫ Contains 9,900 households within 0.5-mile buffer of the stations ▫ Contains 49,000 jobs within 0.5-mile buffer of the stations

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Concept 4A: Aerial Airport Transit Connector from San Diego International Airport to Port Transit Center/ Consolidated Rental Car Center and Santa Fe Depot Extended to Convention Center	<ul style="list-style-type: none"> ▫ Connections to 63 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Dedicated right-of-way ▫ 3 to 24 minute transit travel time savings ▫ 4-minute headway ▫ 48,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 8 out of 10 segments ▫ 26% reduction on Airport Terminal 1 and 2 Roadways ▫ 26% reduction on SDIA inbound access road ▫ 22% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 70,000 VMT reduction ▫ 0.67% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ 34 parcels affected ▫ Complex construction: at-grade, aerial, cut-and-cover tunnel activities ▫ Located within SDIA or RPZ ▫ 21 major utilities ▫ Medium risk for liquefaction, active faulting, upper soil layer competency ▫ Permitting and coordination: FAA, CCC, USFWS, CDFW, Airport Authority, CPUC, FRA 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$2.5 to \$3.9 billion ▫ Cost/Rider: ~\$5.09 to \$7.62 ▫ Cost/Mile: ~\$0.5 to \$0.8 billion ▫ High O&M costs: guideway infrastructure and energy consumption 	<ul style="list-style-type: none"> ▫ Serves 10 surrounding communities ▫ Population of 26,500 within 0.5-mile buffer of the stations ▫ Contains 14,700 households within 0.5-mile buffer of the stations ▫ Contains 65,700 jobs within 0.5-mile buffer of the stations
Concept 4B: Bored Tunnel Airport Transit Connector from San Diego International Airport to Port Transit Center/ Consolidated Rental Car Center and Santa Fe Depot Extended to Convention Center	<ul style="list-style-type: none"> ▫ Connections to 67 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Dedicated right-of-way ▫ 3 to 24 minute transit travel time savings ▫ 4-minute headway ▫ 48,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 8 out of 10 segments ▫ 26% reduction on Airport Terminal 1 and 2 Roadways ▫ 26% reduction on SDIA inbound access road ▫ 22% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 70,000 VMT reduction ▫ 0.67% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ 46 parcels affected ▫ Complex construction: at-grade, aerial, cut-and-cover, bored tunnel activities ▫ Located within SDIA or RPZ ▫ 23 major utilities ▫ Medium risk for liquefaction, active faulting, upper soil layer competency ▫ Permitting and coordination: FAA, CCC, USFWS, CDFW, Airport Authority, CPUC, FRA, OSHA 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$4.4 to \$6.7 billion ▫ Cost/Rider: ~\$7.47 to \$11.17 ▫ Cost/Mile: ~\$0.9 to \$1.4 billion ▫ High O&M costs: guideway infrastructure and energy consumption 	<ul style="list-style-type: none"> ▫ Serves 10 surrounding communities ▫ Population of 27,001 within 0.5-mile buffer of the stations ▫ Contains 15,100 households within 0.5-mile buffer of the stations ▫ Contains 66,800 jobs within 0.5-mile buffer of the stations
Concept 4C: Hybrid Airport Transit Connector from San Diego International Airport to Port Transit Center/ Consolidated Rental Car Center and Santa Fe Depot Extended to Convention Center	<ul style="list-style-type: none"> ▫ Connections to 63 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Dedicated right-of-way ▫ 3 to 24 minute transit travel time savings ▫ 4-minute headway ▫ 48,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 8 out of 10 segments ▫ 26% reduction on Airport Terminal 1 and 2 Roadways ▫ 26% reduction on SDIA inbound access road ▫ 22% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 70,000 VMT reduction ▫ 0.67% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ 39 parcels affected ▫ Complex construction: at-grade, aerial, cut-and-cover tunnel activities ▫ Located within SDIA or RPZ ▫ 22 major utilities ▫ High risk for liquefaction, active faulting, upper soil layer competency ▫ Permitting and coordination: FAA, CCC, USFWS, CDFW, Airport Authority, CPUC, FRA 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$4.2 to \$6.4 billion ▫ Cost/Rider: ~\$7.27 to \$10.86 ▫ Cost/Mile: ~\$0.9 to \$1.3 billion ▫ High O&M costs: guideway infrastructure and energy consumption 	<ul style="list-style-type: none"> ▫ Serves 10 surrounding communities ▫ Population of 26,500 within 0.5-mile buffer of the stations ▫ Contains 14,700 households within 0.5-mile buffer of the stations ▫ Contains 65,700 jobs within 0.5-mile buffer of the stations

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<p>Concept 5A: Aerial Airport Transit Connector from San Diego International Airport to Port Transit Center/ Consolidated Rental Car Center and Santa Fe Depot Extended to Civic/Core</p>	<ul style="list-style-type: none"> ▫ Connections to 59 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Dedicated right-of-way ▫ 3 to 24 minute transit travel time savings ▫ 4-minute headway ▫ 50,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 8 out of 10 segments ▫ 26% reduction on Airport Terminal 1 and 2 Roadways ▫ 26% reduction on SDIA inbound access road ▫ 23% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 129,000 VMT reduction ▫ 0.91% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ 37 parcels affected ▫ Complex construction: at-grade, aerial, cut-and-cover tunnel activities ▫ Located within SDIA or RPZ ▫ 15 major utilities ▫ Medium risk for liquefaction, active faulting, upper soil layer competency ▫ Permitting and coordination: FAA, CCC, USFWS, CDFW, Airport Authority, CPUC, FRA 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$2.4 to \$3.7 billion ▫ Cost/Rider: ~\$4.65 to \$6.95 ▫ Cost/Mile: ~\$0.6 to \$0.9 billion ▫ High O&M costs: guideway infrastructure and energy consumption 	<ul style="list-style-type: none"> ▫ Serves 10 surrounding communities ▫ Population of 29,000 within 0.5-mile buffer of the stations ▫ Contains 16,100 households within 0.5-mile buffer of the stations ▫ Contains 72,400 jobs within 0.5-mile buffer of the stations
<p>Concept 5B: Bored Tunnel Airport Transit Connector from San Diego International Airport to Port Transit Center/ Consolidated Rental Car Center and Santa Fe Depot Extended to Civic/Core</p>	<ul style="list-style-type: none"> ▫ Connections to 63 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Dedicated right-of-way ▫ 3 to 24 minute transit travel time savings ▫ 4-minute headway ▫ 50,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 8 out of 10 segments ▫ 26% reduction on Airport Terminal 1 and 2 Roadways ▫ 26% reduction on SDIA inbound access road ▫ 23% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 129,000 VMT reduction ▫ 0.91% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ 37 parcels affected ▫ Complex construction: at-grade, aerial, cut-and-cover, bored tunneling activities ▫ Located within SDIA or RPZ ▫ 19 major utilities ▫ High risk for liquefaction, active faulting, upper soil layer competency ▫ Permitting and coordination: FAA, CCC, USFWS, CDFW, Airport Authority, CPUC, FRA, OSHA 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$4.1 to \$6.3 billion ▫ Cost/Rider: ~\$6.87 to \$10.27 ▫ Cost/Mile: ~\$1.0 to \$1.5 billion ▫ High O&M costs: guideway infrastructure and energy consumption 	<ul style="list-style-type: none"> ▫ Serves 10 surrounding communities ▫ Population of 29,500 within 0.5-mile buffer of the stations ▫ Contains 16,400 households within 0.5-mile buffer of the stations ▫ Contains 72,400 jobs within 0.5-mile buffer of the stations
<p>Concept 5C: Hybrid Airport Transit Connector from San Diego International Airport to Port Transit Center/ Consolidated Rental Car Center and Santa Fe Depot Extended to Civic/Core</p>	<ul style="list-style-type: none"> ▫ Connections to 59 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Dedicated right-of-way ▫ 3 to 24 minute transit travel time savings ▫ 4-minute headway ▫ 50,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 8 out of 10 segments ▫ 26% reduction on Airport Terminal 1 and 2 Roadways ▫ 26% reduction on SDIA inbound access road ▫ 23% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 129,000 VMT reduction ▫ 0.91% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ 30 parcels affected ▫ Complex construction: at-grade, aerial, cut-and-cover tunnel activities ▫ Located within SDIA or RPZ ▫ 17 major utilities ▫ High risk for liquefaction, active faulting, upper soil layer competency ▫ Permitting and coordination: FAA, CCC, USFWS, CDFW, Airport Authority, CPUC, FRA 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$3.7 to \$5.7 billion ▫ Cost/Rider: ~\$6.37 to \$9.53 ▫ Cost/Mile: ~\$0.9 to \$1.4 billion ▫ High O&M costs: guideway infrastructure and energy consumption 	<ul style="list-style-type: none"> ▫ Serves 10 surrounding communities ▫ Population of 29,000 within 0.5-mile buffer of the stations ▫ Contains 16,100 households within 0.5-mile buffer of the stations ▫ Contains 72,400 jobs within 0.5-mile buffer of the stations

CRITERION	PASSENGER CONVENIENCE AND RIDERSHIP <i>Regional Connectivity, User Experience, Travel Time, Ridership¹</i>	CONGESTION OF AIRPORT ACCESS <i>Traffic Effects¹</i>	VMT AND GHG <i>Vehicle Miles Traveled and Greenhouse Gas Change¹</i>	FEASIBILITY / COMPLEXITY <i>Right-of-Way Construction Effects/Constructability, Utility Impacts, Geotechnical and Seismic Conditions, Regulatory Considerations</i>	COST <i>Capital Cost, Annualized Cost per Rider, Cost per Mile, Operations and Maintenance</i>	COMMUNITY EFFECTS AND ECONOMIC BENEFITS <i>Adjacent Development Considerations, Adjacent Community Effects</i>
Concept 6: Trolley Concept from SDIA to 12th & Imperial Transit Center	<ul style="list-style-type: none"> ▫ Connections to 65 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Dedicated right-of-way until Trolley Blue and Green Lines ▫ 0 to 23 minute transit travel time savings and travel time increase to one location ▫ 15-minute headways ▫ 14,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 7 out of 10 segments ▫ 10% reduction on Airport Terminal 1 and 2 Roadways ▫ 10% reduction on SDIA inbound access road ▫ 11% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 51,000 VMT reduction ▫ 0.83% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ 11 parcels affected ▫ Connection to existing Trolley tracks requires complex construction and shoofly track ▫ 10 major utilities ▫ High risk for liquefaction, active faulting, upper soil layer competency ▫ Permitting and coordination: FAA, CCC, USFWS, CDFW, Airport Authority, CPUC, FRA 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$1.1 to \$1.8 billion ▫ Cost/Rider: ~\$6.93 to \$10.37 ▫ Cost/Mile: ~\$294 to \$449 million ▫ High O&M costs: guideway infrastructure, operators, and support staff, vehicle maintenance, train controls 	<ul style="list-style-type: none"> ▫ Serves 7 surrounding communities ▫ Population of 28,500 within 0.5-mile buffer of the stations ▫ Contains 15,600 households within 0.5-mile buffer of the stations ▫ Contains 70,000 jobs within 0.5-mile buffer of the stations
Concept 7: Bus Concept from San Diego International Airport to Old Town Transit Center and City College	<ul style="list-style-type: none"> ▫ Connections to 74 destinations ▫ Transfers to MTS bus routes, Trolley lines, Amtrak, and COASTER ▫ Transit-only and mixed traffic lanes ▫ 1 to 24 minute transit travel time savings and travel time increase to four locations ▫ 7.5 to 10-minute headway ▫ 9,000 daily boardings 	<ul style="list-style-type: none"> ▫ Reduction of ADT in 7 out of 10 segments ▫ 7% reduction on Airport Terminal 1 and 2 Roadways ▫ 8% reduction on SDIA inbound access road ▫ 10% reduction on Laurel Street from Pacific Hwy to Harbor Dr 	<ul style="list-style-type: none"> ▫ 22,000 VMT reduction ▫ 0.65% GHG emissions reduction 	<ul style="list-style-type: none"> ▫ No property acquisitions, building demolitions, or major utility impacts ▫ Construction limited to traffic signaling upgrades, intersection and lane reconfigurations, pavement repair or replacement in some areas, and limited ramp or lane construction to connect transit-only lanes ▫ Permitting and coordination: CCC 	<ul style="list-style-type: none"> ▫ Capital Cost: ~\$46 to \$70 million ▫ Cost/Rider: ~\$0.91 to \$1.37 ▫ Cost/Mile: ~\$6.9 to \$10.6 million ▫ High O&M costs: support staff, motive power, and energy consumption 	<ul style="list-style-type: none"> ▫ Serves 9 surrounding communities ▫ Population of 36,600 within 0.5-mile buffer of the stations ▫ Contains 20,400 households within 0.5-mile buffer of the stations ▫ Contains 88,300 jobs within 0.5-mile buffer of the stations

Source: SANDAG, WSP, HDR, GPM, and TAHA 2022

Notes: ¹Ridership, ADT, VMT, and GHG reflect 2050 values.

ADT = average daily traffic; CCC = California Coastal Commission; CDFW = California Department of Fish and Wildlife; CPUC = California Public Utilities Commission; FAA = Federal Aviation Administration; FRA = Federal Railroad Administration; GHG = greenhouse gases; MTS = Metropolitan Transit System; O&M = Operations and Maintenance; OSHA = Occupational Safety and Health Administration; RPZ = Runway Protection Zone; SDIA = San Diego International Airport; USFWS = United States Fish and Wildlife Service; VMT = vehicle miles traveled

2. INTRODUCTION AND BACKGROUND

The San Diego Association of Governments (SANDAG) has undertaken this Concept Evaluation Study (study) to develop and evaluate the concepts to create a regional transit connection to San Diego International Airport (SDIA) as part of the Central Mobility Hub (CMH) Project. The evaluation builds off prior studies to identify and compare the various transit concepts. This report identifies the leading concepts to be considered for creating a direct transit connection to SDIA. These concepts fall within three primary transit modes of technology: airport transit connection with automated people mover technology, San Diego Trolley (Trolley) light rail transit, and enhanced bus.

2.1. Background

The need for a regional transit connection to SDIA has been discussed in the San Diego region for almost 40 years. In 2018, the SANDAG Board of Directors (Board) established an Airport Connectivity Subcommittee to explore opportunities to connect SDIA to the regional transit system. The subcommittee's findings culminated in the release of the *Airport Connectivity Analysis* (SANDAG 2019) (ACA) report in October 2019. The report identified five concepts: two Airport Transit Connector (ATC) concepts connecting the airport to a CMH at Naval Information Warfare Systems Command, one concept connecting to a CMH at the previously studied Intermodal Transit Center site, and two Trolley extension concepts.

In April 2021, the local environmental process began with the release of the Notice of Preparation (NOP). Three concepts were included in the NOP, an ATC from the airport to a CMH at Naval Information Warfare Systems Command, an ATC from the airport to a CMH at the Intermodal Transit Center site, and a Trolley extension. Public input received in response to the NOP suggested two additional opportunities for the location of the CMH and the connection point of an ATC to the airport: the existing Port of San Diego Headquarters site and Downtown San Diego. Sites in both locations were studied by SANDAG in 2021. On December 3, 2021, SANDAG staff provided a project update to the SANDAG Board, including progress related to the two additional locations for the CMH. As part of the project update, SANDAG staff informed the Board that staff will continue to study potential options for the CMH while advancing the airport connectivity component.

In April 2022, the Navy and SANDAG mutually agreed to cease exploration of the Navy's Old Town Campus as a site for the CMH. On May 13, 2022, SANDAG staff presented an update on the CMH Project to the Board, focusing on the airport connectivity component. In response to the staff presentation, the Board inquired about other potential logical termini and modes for the transit connection to the airport. Based on the feedback received from the Board in May 2022, SANDAG staff has developed this Concept Evaluation Study to document and evaluate the concepts for a regional transit connection to SDIA.

2.2. Purpose of Report

The purpose of this study is to identify and compare concepts for providing a regional transit connection to and from SDIA, considering logical termini³ and modes. This study builds off the ACA with a specific focus on identifying a transit connection. Chapter 3 consists of three key transit modes: an ATC connection, extension of the Trolley, and enhanced bus service. Chapter 4 describes the evaluation criteria developed to compare concepts quantitatively and qualitatively. Chapter 5 presents the evaluation of the concepts using the criteria described in Chapter 4. Chapter 6 summarizes stakeholder coordination for the project. Chapter 7 discusses future steps.

³ Logical termini are defined as the rational beginning and end points for a transportation project.

3. AIRPORT CONNECTION CONCEPTS

This chapter provides a description of the concepts, the concepts considered and eliminated, and potential future extensions associated with the concepts.

3.1. Concepts Studied in this Report

Concepts within three modes of transit technology were considered for a direct transit connection to the airport:

- (1) An Airport Transit Connector (ATC) using an automated people mover system
- (2) An extension of the San Diego Trolley (Trolley) system
- (3) Enhanced bus service

For the ATC concepts, transit connections to the north and south of San Diego International Airport (SDIA) were evaluated with variations of stops, termini, configurations, and features. All ATC concepts assume an operations, maintenance, and storage facility (OMSF) would be located on the Port Headquarters site and property on Pacific Highway between Sassafras Street and Laurel Street. The ATC concepts evaluated in this study, include the provision of both a northern and southern alignment for the ATC, though the stops, termini, configurations, and ultimate location of the OMSF, are subject to further analysis and modification, and will be confirmed during the environmental clearance process. The concepts and features outlined in Table 3-1 are described in more detail in the sections that follow.

Table 3-1. Concepts Studied in this Report

MODE	CONCEPT		POTENTIAL FEATURES/VARIATIONS
ATC	North Route Only ¹	Concept 1 SDIA to CONRAC/PTC	Concept 1A: SDIA to CONRAC/PTC Concept 1B: Concept 1A + DAR to/from I-5 Concept 1C: Concept 1A+LOSSAN (COASTER and/or Surfliner) Platform
		Concept 2: SDIA to OTTC	N/A
	North and South Routes Combined	Concept 3: SDIA to PTC/CONRAC and Santa Fe Depot	Concept A: Aerial Concept B: Bored Tunnel Concept C: Hybrid (aerial and bored tunnel)
		Concept 4: SDIA to PTC/CONRAC and Convention Center	
		Concept 5: SDIA to PTC/CONRAC and Civic/Core	
Trolley	Concept 6: SDIA to 12th & Imperial Transit Center		N/A

MODE	CONCEPT	POTENTIAL FEATURES/VARIATIONS
Enhanced Bus	Concept 7: Route from SDIA to OTTC and Route from SDIA to Santa Fe Depot and City College	N/A

Source: SANDAG 2022

Notes: ¹For the ATC concepts, the study started with the assumption that a north route was necessary in any configuration to accommodate potential locations for a required vehicle maintenance and storage facility. For this reason, a full evaluation of south-route-only concepts is not included in this report, though some initial modeling was performed on a south-route-only configuration of Concept 5 (SDIA to Civic Center, which can be found in Appendix S). However, SANDAG plans to evaluate additional options to accommodate the vehicle maintenance and storage facility, and conduct further analysis of phasing the ATC concepts, including starting with a south-route-only option. ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; DAR = direct access ramp; LOSSAN = Los Angeles–San Diego–San Luis Obispo Rail Corridor; N/A = not applicable; OTTC = Old Town Transit Center; PTC = Port Transit Center; SDIA = San Diego International Airport

3.1.1. Airport Transit Connector Concepts North Route

3.1.1.1. Concept 1: Airport Transit Connector from San Diego International Airport to Port Transit Center and the Consolidated Rental Car Center

The three variations of Concept 1 are described in the following sections.

Concept 1A: Airport Transit Connector from San Diego International Airport to Port Transit Center and the Consolidated Rental Car Center

Concept 1A would feature a high-frequency ATC in a dedicated right-of-way from SDIA to a transit center at the current Port Headquarters (referred to as the Port Transit Center (PTC)), and a terminus station at the Consolidated Rental Car Center (CONRAC) site. This concept also would include an optional station at Harbor Island East Basin. Figure 3-1 shows the alignment for Concept 1A. Table 3-2 provides additional information on concept characteristics.

From the SDIA Station located at the transit-ready area at the airport, the fixed guideway would be an aerial structure along Harbor Drive before transitioning to a cut-and-cover tunnel adjacent to Laurel Street through the limits of the runway protection zone. The alignment would remain in a tunnel under Pacific Highway and then turn north and transition to be at-grade and parallel with the existing Metropolitan Transit System (MTS) right-of-way to an ATC station at the PTC. North of this station, the guideway would transition to an aerial structure and cross Pacific Highway and Admiral Boland Way to terminate at the CONRAC Station. Refer to Appendix A for a more detailed exhibit of the concept alignment.

The PTC would include connections to the Trolley Blue and Trolley Green Lines via the existing Middletown Station, and bus. Vehicular access from local streets would also be provided to and from the PTC and I-5. Access to the PTC from I-5 would be available by traveling 0.8 mile on local streets from northbound I-5 and 0.5 mile from southbound I-5. Traveling from the PTC, vehicles would have access to northbound I-5 by traveling 1.5 miles of local streets, and to southbound I-5 in 0.4 mile. Concept 1A would require closure of Palm Street. Establishing alternate means of connecting Kettner Boulevard to Pacific Highway without requiring travel to Laurel Street would be explored as project development continues.

Figure 3-1. Concept 1A: Airport Transit Connector from San Diego International Airport to Port Transit Center and the Consolidated Rental Car Center



Source: WSP, HDR, GPM 2023

Table 3-2. Concept 1 Characteristics

CHARACTERISTIC ¹	
Length of alignment at-grade (miles)	0.4
Length of alignment on aerial structure (miles)	1.7
Length of alignment in tunnel (miles)	0.3
Total alignment length (miles)	2.4
Number of stations	3 ²
Minimum/shortest headways	2 minutes ³

Source: WSP, HDR 2022

Notes:

¹The characteristics presented are common for Concept 1A, 1B, and 1C

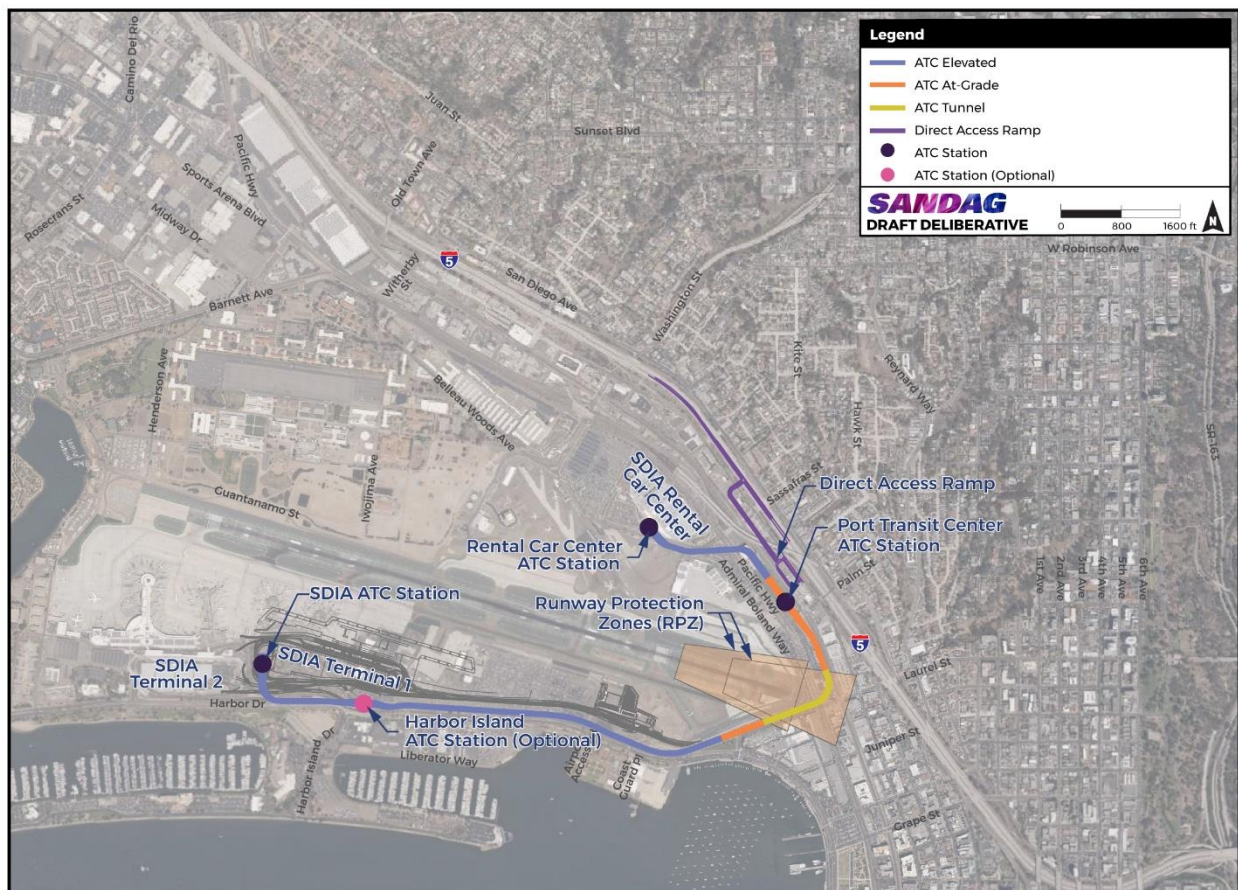
²Harbor Island is a potential fourth station.

³When combined with a south route concept, headways would be four minutes at the PTC and CONRAC Stations and would remain two minutes from SDIA and the optional Harbor Island Station.

Concept 1B: Airport Transit Connector from San Diego International Airport to Port Transit Center and the Rental Car Center with a Direct Access Ramp

Concept 1B would have the same ATC alignment and stations as those described for Concept 1A. This concept variation would include a direct access ramp (DAR) to and from both northbound and southbound I-5 that would provide enhanced access to and from the PTC. A connection to Kettner Boulevard would be provided from the drop-off area at the end of the DAR. The DAR is depicted in Figure 3-2. Refer to Appendix B for a more detailed exhibit of the concept.

Figure 3-2. Concept 1B Airport Transit Connector from San Diego International Airport to Port Transit Center and the Consolidated Rental Car Center with a Direct Access Ramp

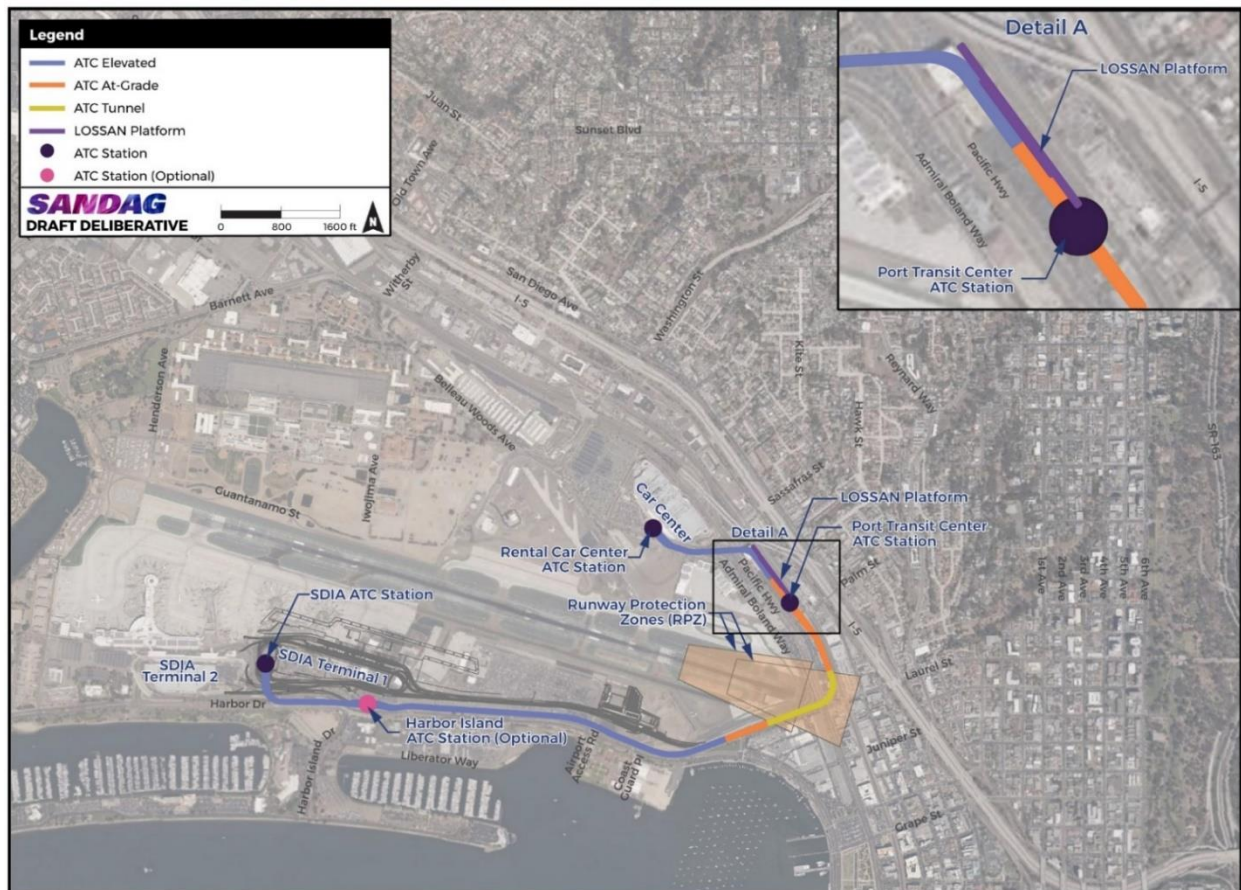


Source: WSP, HDR, GPM 2023

Concept 1C: Airport Transit Connector from San Diego International Airport to Port Transit Center and the Consolidated Rental Car Center with a LOSSAN Platform

Concept 1C would have the same ATC alignment and stations as those described for Concept 1A. This concept variation would include a single Los Angeles–San Diego–San Luis Obispo Rail Corridor (LOSSAN) side platform to serve COASTER and/or Amtrak passengers (Figure 3-3). It is assumed the platform would serve both northbound and southbound trains, although continued coordination with the North County Transit District and additional operational modeling is required to determine whether the platform has operational benefits. The side platform would be located on a new siding track off Main Track 2 to serve the platform, which would turn out just south of Sassafras Street and tie back in north of Palm Street. The platform length would be limited to 850 feet due to the limited space constraints caused by the existing I-5 overpass ramps and to avoid reconstruction of the ramps. Two LOSSAN platforms were considered but are not included in Concept 1C due to impacts to the Pacific Highway ramps that connect to I-5. Refer to Appendix C for a more detailed exhibit of the concept alignment.

Figure 3-3. Concept 1C Airport Transit Connector from San Diego International Airport to Port Transit Center and the Consolidated Rental Car Center with a LOSSAN Platform



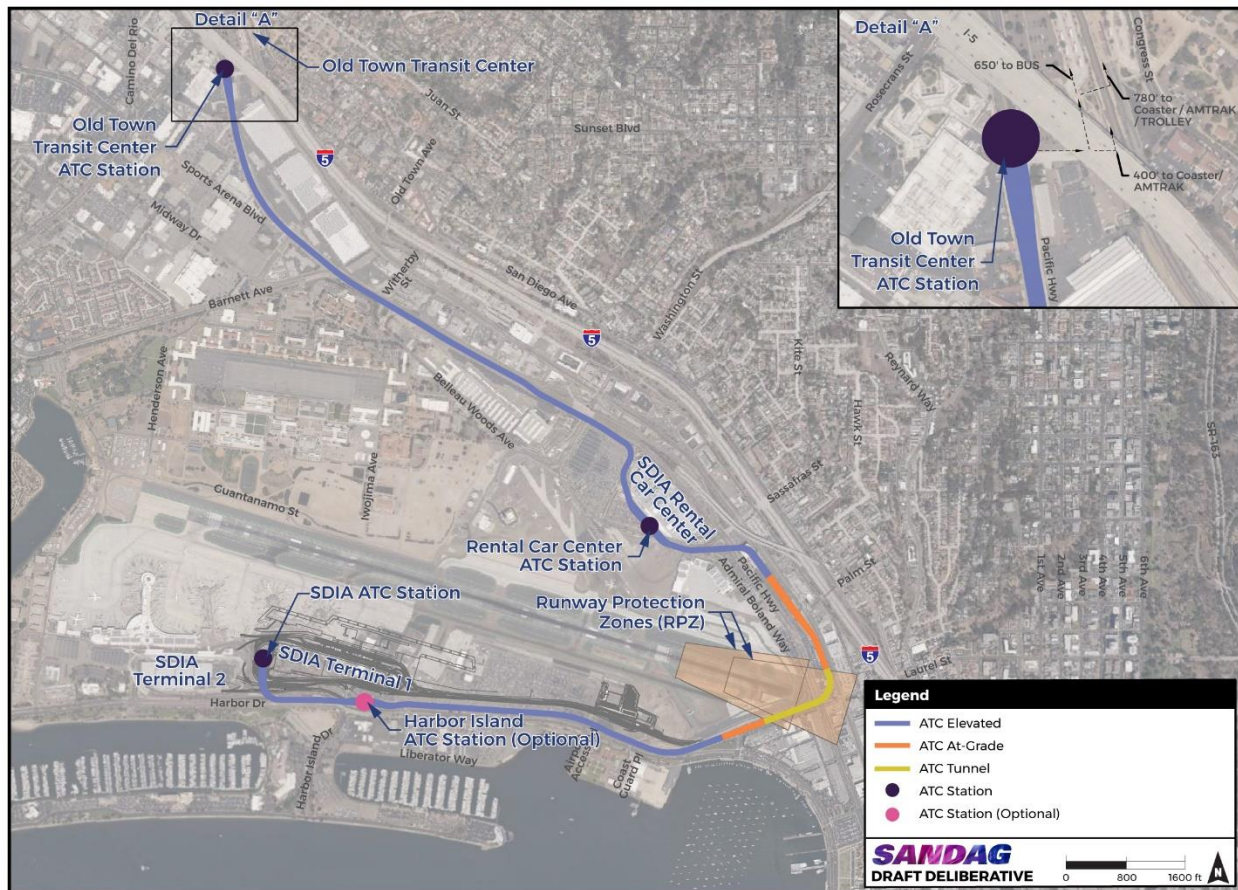
Source: WSP, HDR, GPM 2023

3.1.1.2. Concept 2: Airport Transit Connector from San Diego International Airport to Old Town Transit Center

Similar to Concept 1, Concept 2 would provide a high-frequency ATC in a dedicated right-of-way from SDIA but to a northern terminus at the Old Town Transit Center (OTTC) (Figure 3-4). Concept 2 would include ATC stations at the transit-ready area at SDIA and at the CONRAC site and continue north to terminate with a station at the existing OTTC, with an optional station at Harbor Island. Table 3-3 provides additional information on concept characteristics.

From the SDIA Station, Concept 2 follows the same alignment as Concept 1A to the Rental Car Center ATC Station; however, this concept would not include the PTC Station included in Concept 1A. From the Rental Car Center ATC Station, Concept 2 would extend an additional 1.8 miles on an aerial structure located along the median of Pacific Highway to the OTTC ATC Station, located south of I-5. Refer to Appendix D for a more detailed exhibit of the concept alignment.

Figure 3-4. Concept 2 – Airport Transit Connector from San Diego International Airport to Old Town Transit Center



Source: WSP, HDR, GPM 2023

Table 3-3. Concept 2 Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0.4
Length of alignment on aerial structure (miles)	3.5
Length of alignment in tunnel (miles)	0.3
Total alignment length (miles)	4.1
Number of stations	3 ¹
Minimum/shortest headways	2 minutes

Source: WSP, HDR 2022

Notes: ¹Harbor Island is a potential fourth station.

Numbers may not equal due to rounding.

The OTTC ATC Station would provide connections to the Trolley Blue and Trolley Green Lines, Amtrak Pacific Surfliner, COASTER, and bus via the existing OTTC. Travelers would have access to the MTS bus routes and the Trolley platforms at the existing OTTC within a 780-foot walk and the existing COASTER and Amtrak platform within a 400-foot walk (Figure 3-4). Vehicular access would be available to the OTTC from I-5 by traveling 2.3 miles on local streets from northbound I-5 and 1 mile from southbound I-5. Traveling from the OTTC, vehicles would have access to northbound I-5 by traveling 1.2 miles of local streets, and to southbound I-5 in 2.2 miles.

3.1.2. Airport Transit Connector Concepts with a North and South Route

Three termini were considered for the south route of the ATC, one at Santa Fe Depot (Concept 3), one that would include a stop at Santa Fe Depot and terminate at the Convention Center (Concept 4), and one that would include a stop at Santa Fe Depot and terminate at the Civic Center (Concept 5). Each concept has variations on the route to the terminal station with aerial, bored tunnel, and hybrid (i.e., aerial and underground) options. For this analysis, Concepts 3, 4, and 5 are combined with Concept 1A. However, the text in this section focuses on the description of the south route, starting where the alignment would spur, or branch off, from the north route. Concepts 3, 4, and 5 could functionally operate as a north and south route concept, as currently evaluated in this study, or alternatively could operate as a south route only. The alignment of these ATC concepts is subject to further analysis and modification, and will be confirmed during the environmental process.

3.1.2.1. Concept 3: Airport Transit Connector from San Diego International Airport to Port Transit Center/Consolidated Rental Car Center and Santa Fe Depot

The three variations of Concept 3 are described in the following sections.

Concept 3A: Aerial Airport Transit Connector from San Diego International Airport to Santa Fe Depot

Concept 3A would feature a 1.4-mile high-frequency aerial ATC alignment in a dedicated right-of-way branching off from Concept 1A at Coast Guard Place. The alignment would provide a connection between SDIA and a terminus at Santa Fe Depot (Figure 3-5). This concept would

include an optional station at the County Administration Building ATC Station, and when interlining with a north route concept, passengers would have access to the SDIA ATC Station and optional Harbor Island ATC Station without needing to transfer. Table 3-4 provides additional information on concept characteristics.

Branching off the north route connection at Coast Guard Place, the Concept 3A aerial alignment would follow Harbor Drive, pass the Solar Turbines campus, and turn southeast through the existing Solar Turbines parking lot. The optional County Administration Building ATC Station would be located between Grape Street and Hawthorn Street. South of Grape Street, the alignment would continue south along the median of Pacific Highway before turning east on Broadway to the Santa Fe Depot ATC terminus station. Refer to Appendix E for a more detailed exhibit of the concept alignment.

The proposed Santa Fe Depot ATC Station would be located at Broadway and Kettner Boulevard, southeast of the existing Santa Fe Depot. This station would provide connections to the Trolley Blue and Trolley Green Lines, Amtrak Pacific Surfliner, COASTER, and bus.

Figure 3-5. Concept 3A Aerial Airport Transit Connector from San Diego International Airport to Santa Fe Depot



Source: WSP, HDR, GPM 2023

Table 3-4. Concept 3A Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0
Length of alignment on aerial structure (miles)	1.4
Length of alignment in tunnel (miles)	0
Total alignment length (miles)	1.4
Number of stations ¹	1 ²
Minimum/shortest headways	4 minutes ³

Source: WSP, HDR 2022

Notes:

¹Stations include only those provided for the south route concept, although south route passengers would also have access to the Concept 1A SDIA ATC Station and optional Harbor Island ATC Station.

²County Administration Building is a potential second station.

³When combined with a north route concept, headways would be two minutes where the concepts overlap at SDIA and the optional Harbor Island Station.

Concept 3B: Bored Tunnel Airport Transit Connector from San Diego International Airport to Santa Fe Depot

Concept 3B would feature a 1.1-mile high-frequency underground ATC alignment branching off from Concept 1A to connect SDIA and Santa Fe Depot. This concept would also include an optional County Administration Building ATC Station at Grape Street and Hawthorn Street, and when interlining with a north route concept, passengers would have access to the SDIA ATC Station and optional Harbor Island ATC Station. Table 3-5 provides information on concept characteristics, and Figure 3-6 illustrates the concept alignment.

Table 3-5. Concept 3B Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0
Length of alignment on aerial structure (miles)	0
Length of alignment in tunnel (miles)	1.1
Total alignment length (miles)	1.1
Number of stations ¹	1 ²
Minimum/shortest headways	4 minutes ³

Source: WSP, HDR 2022

Notes:

¹Stations include only those provided for the south route concept, although south route passengers would also have access to the Concept 1A SDIA ATC Station and optional Harbor Island ATC Station.

²County Administration Building is a potential second station.

³When combined with a north route concept, headways would be two minutes where the concepts overlap at SDIA and the optional Harbor Island Station.

Figure 3-6. Concept 3B Bored Tunnel Airport Transit Connector from San Diego International Airport to Santa Fe Depot



Source: WSP, HDR, and GPM 2023

Adjacent to Laurel Street, the alignment would branch off from a north route concept at the cut-and-cover tunnel segment of the north route before transitioning to a bored tunnel traveling south beneath Pacific Highway. The Concept 3B alignment would be constructed using a tunnel boring machine (TBM). The TBM launch site would be located at the OMSF on the Port Headquarters site located along the north route concepts, and a temporary starter tunnel would be provided. South of Grape Street, the Concept 3B alignment would travel south beneath Pacific Highway before continuing east on Broadway to the Santa Fe Depot ATC Station at Broadway and Kettner Boulevard. Refer to Appendix F for a more detailed exhibit of the concept alignment.

Concept 3C: Hybrid Airport Transit Connector from San Diego International Airport to Santa Fe Depot

As with Concepts 3A and 3B, Concept 3C would also provide a high-frequency ATC alignment between SDIA and a terminus at the Santa Fe Depot ATC Station and would include an optional County Administration Building ATC Station. Concept 3C would feature a combination of at-grade, aerial, and underground alignment sections. Table 3-6 provides information on concept characteristics, and Figure 3-7 illustrates the concept alignment.

Table 3-6. Concept 3C Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0.1
Length of alignment on aerial structure (miles)	0.4
Length of alignment in tunnel (miles)	0.9
Total alignment length (miles)	1.4
Number of stations ¹	1 ²
Minimum/shortest headways	4 minutes ³

Source: WSP, HDR 2022

Notes:

¹Stations include only those provided for the south route concept, although south route passengers would also have access to the Concept 1A SDIA ATC Station and optional Harbor Island ATC Station.

²County Administration Building is a potential second station.

³When combined with a north route concept, headways would be two minutes where the concepts overlap at SDIA and the optional Harbor Island Station.

Figure 3-7. Concept 3C Hybrid Airport Transit Connector from San Diego International Airport to Santa Fe Depot



Source: WSP, HDR, and GPM 2023

Concept 3C would branch off from a north route concept at Coast Guard Place in an aerial alignment and would continue east along Harbor Drive for 0.4 mile. As Harbor Drive curves south, the alignment would continue at-grade for 0.1 mile in a sloped transition from an elevated guideway to a tunnel in a retained cut and retained fill guideway. North of Hawthorn Street, the alignment would transition to a cut-and-cover-tunnel and turn southeast below the Solar Turbines parking lot. The TBM launch site for this concept would be located at the Solar Turbine parking lot between Hawthorn Street and Grape Street to the north and south, and Harbor Drive and Pacific Highway to the east and west. North of Grape Street, the alignment would transition to a bored tunnel before continuing south beneath Pacific Highway. South of Grape Street, Concept 3C would follow the same alignment described for Concept 3B in a bored tunnel to the Santa Fe Depot ATC Station. Refer to Appendix G for a more detailed exhibit of the concept alignment.

3.1.2.2. Concept 4: Airport Transit Connector from San Diego International Airport to Port Transit Center/Consolidated Rental Car Center and Santa Fe Depot Extended to Convention Center

The three variations of Concept 4 are described in the following sections.

Concept 4A: Aerial Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Convention Center

Concept 4A would feature a 2.3-mile high-frequency aerial ATC in a dedicated right-of-way from a north route concept with a connection between SDIA and a terminus at the Convention Center. This concept would also provide a Santa Fe Depot ATC Station, creating a connection to the existing Santa Fe Depot and an optional County Administration Building ATC Station. When interlining with a north route concept, passengers would have access to the SDIA ATC Station and optional Harbor Island ATC Station. Table 3-7 provides information on concept characteristics. Figure 3-8 shows the Concept 4A alignment.

As with Concept 3A, the Concept 4A alignment would travel in an aerial alignment along Harbor Drive from a connection to a north route concept at Coast Guard Place. The alignment would follow Harbor Drive, pass the Solar Turbines campus, and turn southeast through the existing Solar Turbines parking lot. The optional County Administration Building ATC Station would be located between Grape Street and Hawthorn Street. South of Grape Street, the alignment would continue south along the median of Pacific Highway, as with Concept 3A. South of Ash Street, the alignment would connect to the new Santa Fe Depot Station, located between Broadway and Ash Street. A direct pedestrian connection would be provided from the ATC station to the nearest platform at Santa Fe Depot. At Broadway, the Concept 4A alignment would provide an aerial stub-ended spur east of Pacific Highway for potential future extension. At Market Street, Concept 4A would curve to travel southeast along Harbor Drive, adjacent to the existing Trolley Green Line tracks, to the Convention Center ATC Station. Refer to Appendix H for a more detailed exhibit of the concept alignment.

Table 3-7. Concept 4A Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0
Length of alignment on aerial structure (miles)	2.3
Length of alignment in tunnel (miles)	0
Total alignment length (miles)	2.3
Number of stations ¹	2 ²
Minimum/shortest headways	4 minutes ³

Source: WSP, HDR 2022

Notes:

¹Stations include only those provided for the south route concept, although south route passengers would also have access to the Concept 1A SDIA ATC Station and optional Harbor Island ATC Station.

²County Administration Building is a potential third station.

³When combined with a north route concept, headways would be two minutes where the concepts overlap at SDIA and the optional Harbor Island Station.

Figure 3-8. Concept 4A Aerial Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Convention Center



Source: WSP, HDR, and GPM 2023

Concept 4B: Bored Tunnel Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Convention Center

Concept 4B would also provide a connection between SDIA and a new terminus station at the Convention Center in a high-frequency underground ATC. As with Concept 4A, Concept 4B would travel south from a connection to SDIA via a north route concept to a new Convention Center ATC Station, providing additional connections at the Santa Fe Depot ATC Station and an optional County Administration Building ATC Station. When interlining with a north route concept, passengers would have access to the SDIA ATC Station and optional Harbor Island ATC Station. Table 3-8 provides additional information on concept characteristics. Figure 3-9 shows the Concept 4B alignment.

Concept 4B would branch off from a north route concept at the cut-and-cover segment of the north route adjacent to Laurel Street. The TBM launch site would be located at the OMSF on the Port Headquarters site located along the north route concepts, and a temporary starter tunnel would be provided. The alignment would transition to a bored tunnel to continue south beneath Pacific Highway, and the optional County Administration Building ATC Station would be located along Pacific Highway, between Grape Street and Hawthorn Street. South of Grape Street, Concept 4B would follow the same route as described for Concept 4A in an underground tunnel south beneath Pacific Highway and southeast beneath Harbor Drive to the Convention Center ATC Station. The Santa Fe Depot Station would be located between Broadway and Ash Street. A direct pedestrian connection would be provided from the ATC station to the nearest platform at Santa Fe Depot. This concept would also provide a stub-ended spur at Broadway, east of Pacific Highway, for a potential future extension as a cut-and-cover tunnel. Refer to Appendix I for a more detailed exhibit of the concept alignment.

Table 3-8. Concept 4B Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0
Length of alignment on aerial structure (miles)	0
Length of alignment in tunnel (miles)	2.0
Total alignment length (miles)	2.0
Number of stations ¹	2 ²
Minimum/shortest headways	4 minutes ³

Source: WSP, HDR 2022

Notes:

¹Stations include only those provided for the south route concept, although south route passengers would also have access to the Concept 1A SDIA ATC Station and optional Harbor Island ATC Station.

²County Administration Building is a potential third station.

³When combined with a north route concept, headways would be two minutes where the concepts overlap at SDIA and the optional Harbor Island Station.

Figure 3-9. Concept 4B Bored Tunnel Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Convention Center



Source: WSP, HDR, and GPM 2023

Concept 4C: Hybrid Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Convention Center

As with Concepts 4A and 4B, Concept 4C would provide a high-frequency ATC alignment between SDIA and a new terminus at the Convention Center ATC Station, including a Santa Fe Depot ATC Station and an optional County Administration Building ATC Station. Concept 4C would feature at-grade, aerial, and underground alignment sections. Table 3-9 provides information on concept characteristics, and Figure 3-10 illustrates the concept alignment.

As described for Concept 3C, Concept 4C would branch off from a north route concept at Coast Guard Place in an aerial alignment and would continue east along Harbor Drive for 0.4 mile. The alignment would transition to at-grade for 0.1 mile as Harbor Drive curves south. From an aerial connection to a north route concept at Coast Guard Place, Concept 4C would continue in an aerial alignment for 0.4 mile along Harbor Drive. North of Hawthorn Street, the alignment would transition to a cut-and-cover tunnel and turn southeast below the Solar Turbines parking lot, where the TBM launch site for this concept would be located. South of Grape Street, Concept 4C would follow the same alignment described for Concept 4B in a bored tunnel to the Convention Center ATC Station. Refer to Appendix J for a more detailed exhibit of the concept alignment.

Table 3-9. Concept 4C Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0.1
Length of alignment on aerial structure (miles)	0.4
Length of alignment in tunnel (miles)	1.7
Total alignment length (miles)	2.3
Number of stations ¹	2 ²
Minimum/shortest headways	4 minutes ³

Source: WSP, HDR 2022

Notes:

¹Stations include only those provided for the south route concept, although south route passengers would also have access to the Concept 1A SDIA ATC Station and optional Harbor Island ATC Station.

²County Administration Building is a potential third station.

³When combined with a north route concept, headways would be two minutes where the concepts overlap at SDIA and the optional Harbor Island Station.

Figure 3-10. Concept 4C Hybrid Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Convention Center



Source: WSP, HDR, and GPM 2023

3.1.2.3. Concept 5: Airport Transit Connector from San Diego International Airport to Port Transit Center/Consolidated Rental Car Center and Santa Fe Depot Extended to Civic/Core

The three variations of Concept 5 are described in the following sections.

Concept 5A: Aerial Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Civic Center

Concept 5A would feature a 1.8-mile high-frequency aerial ATC in a dedicated right-of-way from a north route concept with a connection between SDIA and a terminus at a Civic/Core ATC Station on Broadway. Concept 5A would also add a new Santa Fe Depot ATC Station, creating a connection to the existing Santa Fe Depot and an optional County Administration Building ATC Station. When interlining with a north route concept, passengers would also have access to the SDIA ATC Station and optional Harbor Island ATC Station. Table 3-10 provides information on concept characteristics.

Table 3-10. Concept 5A Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0
Length of alignment on aerial structure (miles)	1.8
Length of alignment in tunnel (miles)	0
Total alignment length (miles)	1.8
Number of stations ¹	2 ²
Minimum/shortest headways	4 minutes ³

Source: WSP, HDR 2022

Notes:

¹Stations include only those provided for the south route concept, although south route passengers would also have access to the Concept 1A SDIA ATC Station and optional Harbor Island ATC Station.

²County Administration Building is a potential third station.

³When combined with a north route concept, headways would be two minutes where the concepts overlap at SDIA and the optional Harbor Island Station.

Figure 3-11 shows the Concept 5A alignment, which would be the same as that described for Concept 3A and Concept 4A until B Street. The alignment would branch off from a north route concept at Coast Guard Place and would follow Harbor Drive. The alignment would pass the Solar Turbines campus and turn southeast through the existing Solar Turbines parking lot to connect to the optional County Administration Building ATC Station. South of B Street, the aerial alignment would curve to turn east along Broadway, connecting to the Santa Fe Depot ATC Station located on Broadway at Kettner Boulevard. From the Santa Fe Depot ATC Station, the Concept 5A alignment would continue east along Broadway to the Civic/Core ATC Station. The Civic/Core ATC terminus station would be located on Broadway, west of 3rd Avenue. A dedicated bicycle/pedestrian connection would provide a connection to the existing Trolley Green and Trolley Orange Line Civic Center Station on C Street. Refer to Appendix K for a more detailed exhibit of the concept alignment.

Figure 3-11. Concept 5A Aerial Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Civic/Core



Source: WSP, HDR, and GPM 2023

Concept 5B: Bored Tunnel Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Civic/Core

Concept 5B would feature a south spur of 1.5-mile high-frequency underground ATC in a dedicated right-of-way from a north route concept with a connection between SDIA and a terminus at a Civic/Core ATC Station. As with Concept 5A, Concept 5B would provide a new Santa Fe Depot ATC Station and an optional County Administration Building ATC Station. Table 3-11 provides information on concept characteristics.

Figure 3-12 shows the Concept 5B alignment, which is the same as that described for Concepts 3B and 4B, from Laurel Street to Grape Street, branching off from a north concept via a cut-and-cover tunnel before transitioning to a bored tunnel beneath Pacific Highway. South of Grape Street, the Concept 5B alignment follows the same route as described for Concept 5A in a bored tunnel traveling south beneath Pacific Highway before turning east to continue on Broadway and connect to the Santa Fe Depot ATC Station and Civic/Core ATC Station. Refer to Appendix L for a more detailed exhibit of the concept alignment.

Table 3-11. Concept 5B Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0
Length of alignment on aerial structure (miles)	0
Length of alignment in tunnel (miles)	1.5
Total alignment length (miles)	1.5
Number of stations ¹	2 ²
Minimum/shortest headways	4 minutes ³

Source: WSP, HDR 2022

Notes:

¹Stations include only those provided for the south route concept, although south route passengers would also have access to the Concept 1A SDIA ATC Station and optional Harbor Island ATC Station.

²County Administration Building is a potential third station.

³When combined with a north route concept, headways would be two minutes where the concepts overlap at SDIA and the optional Harbor Island Station.

Figure 3-12. Concept 5B Bored Tunnel Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Civic/Core



Source: WSP, HDR, and GPM 2023

Concept 5C: Hybrid Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Civic/Core

As with Concepts 5A and 5B, Concept 5C would provide a high-frequency ATC alignment from a north route concept with a connection between SDIA and a Civic/Core ATC Station, including a Santa Fe Depot ATC Station and an optional County Administration Building ATC Station. Concept 5C would feature at-grade, aerial, and underground alignment sections. Table 3-12 provides information on concept characteristics, and Figure 3-13 illustrates the concept alignment.

The Concept 5C alignment would be the same as that described for Concept 3C and Concept 4C from Coast Guard Place to Grape Street. At Coast Guard Place, the alignment would branch off from a north route concept before continuing along Harbor Drive in an aerial alignment, followed by an at-grade alignment. Concept 5C would transition to a cut-and-cover tunnel north of Hawthorn Street as it curves southeast. South of Grape Street, Concept 5C would follow the same alignment described for Concept 5B in a bored tunnel beneath Pacific Highway and Broadway to the Civic/Core ATC Station. Refer to Appendix M for a more detailed exhibit of the concept alignment.

Table 3-12. Concept 5C Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0.1
Length of alignment on aerial structure (miles)	0.4
Length of alignment in tunnel (miles)	1.3
Total alignment length (miles)	1.8
Number of stations ¹	2 ²
Minimum/shortest headways	4 minutes ³

Source: WSP, HDR 2022

Notes:

¹Stations include only those provided for the south route concept, although south route passengers would also have access to the Concept 1A SDIA ATC Station and optional Harbor Island ATC Station.

²County Administration Building is a potential third station.

³When combined with a north route concept, headways would be two minutes where the concepts overlap at SDIA and the optional Harbor Island Station.

Figure 3-13. Concept 5C Hybrid Airport Transit Connector from San Diego International Airport to Santa Fe Depot Extended to Civic/Core



Source: WSP, HDR, and GPM 2022

3.1.3. Concept 6: Trolley Concept from San Diego International Airport to 12th & Imperial Transit Center

Concept 6 would feature an extension of the Trolley, providing a connection from SDIA to the existing 12th & Imperial Transit Center (Figure 3-14). Table 3-13 provides information on concept characteristics. The Trolley concept evaluated in this study was developed in coordination with MTS and is substantially similar to the Trolley alternative included in the April 2021 Notice of Preparation (NOP). The alignment would be operated as a new Trolley line, separate from the existing Green, Blue, and Orange Line services.

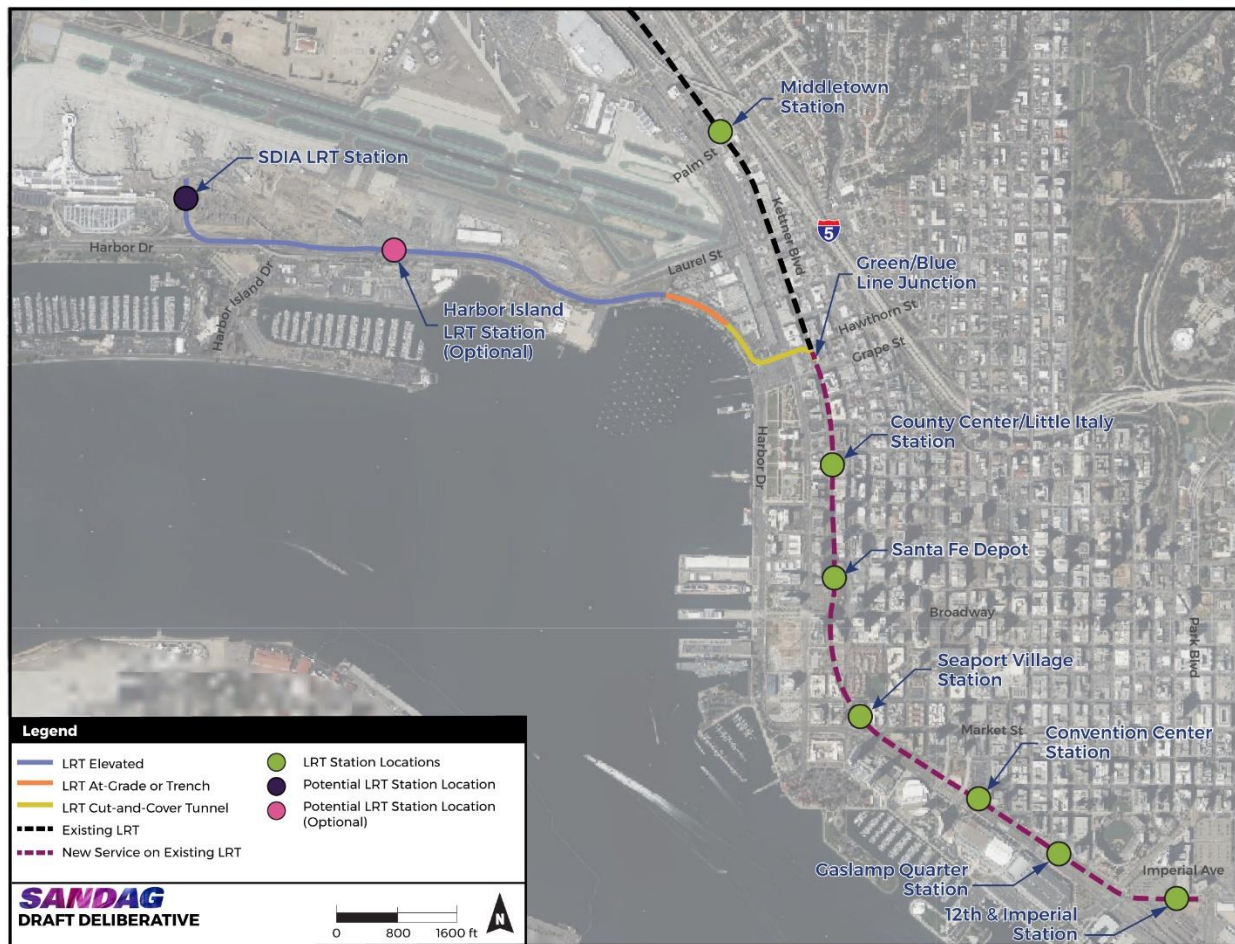
Table 3-13. Concept 6 Characteristics

CHARACTERISTIC	
Length of alignment at-grade (miles)	0.2
Length of alignment on aerial structure (miles)	1.4
Length of alignment in tunnel (miles)	0.3
Length of alignment on existing tracks (miles)	2
Number of stations	8 (6 existing)
Minimum/shortest headways ¹	15 minutes

Source: WSP, HDR 2022

Notes: ¹ Shorter headways may be feasible but could require modifications to existing Trolley infrastructure for the portions of the alignment where the SDIA Trolley route would interline with the Trolley Green and Blue Lines. Such modifications could be considered in future studies.

Figure 3-14. Trolley Concept from SDIA to 12th & Imperial Transit Center



Source: WSP, HDR 2023

From SDIA, Concept 6 would provide a new aerial alignment traveling east along Harbor Drive for 1.4 miles. At Laurel Street, the Concept 6 alignment would shift to at-grade using retaining walls for 0.2 mile before transitioning to a tunnel to continue beneath Harbor Drive. At Hawthorn Street, the underground alignment would turn east to connect with the existing Trolley Green and Blue Line tracks between Pacific Highway and Kettner Boulevard. Concept 6 would continue traveling south using the existing Trolley Green and Blue Line tracks to Santa Fe Depot before continuing south along the Trolley Green Line tracks, terminating at the 12th & Imperial Transit Center. This concept would provide access to the existing Trolley stations at County Center/Little Italy Santa Fe Depot, Seaport Village, Convention Center, and Gaslamp Quarter before terminating at the 12th & Imperial Transit Center. A new Trolley station would be constructed at the transit-ready area at SDIA, and an optional station is under consideration near Harbor Island.

3.1.4. Concept 7: Bus Concept from San Diego International Airport to Old Town Transit Center and City College

Concept 7 would provide enhanced bus service from SDIA to the Trolley Blue Line and Trolley Orange Line City College Station with a second route from SDIA to OTTC. Table 3-14 provides information on concept characteristics for both routes. Figure 3-15 presents the concept alignment from SDIA to City College, and Figure 3-16 presents the alignment from SDIA to OTTC. This concept assumes both routes would be implemented.

The Concept 7 route to City College would provide enhanced service of the MTS Route 992, which provides service from SDIA to Downtown San Diego and City College. Currently, MTS Route 992 operates with 15-minute headways and serves 16 bus stops in one direction. Concept 7 would serve the existing bus stops with an enhanced headway of 7.5 minutes. Concept 7 would travel around the airport in mixed traffic along Airport Terminal Road with stops at Terminal 1 and Terminal 2. From the SDIA entrance, Concept 7 assumes the bus would operate in a dedicated transit-only lane as the route continues east, then south along Harbor Drive. The Concept 7 route would turn east onto Broadway and travel in a dedicated transit lane until the Broadway and Park Boulevard bus stop located between 11th Avenue and Park Boulevard. This stop would provide access to the Trolley Blue Line and Trolley Orange Line City College Station located at the northwest corner of the Broadway and Park Avenue intersection.

The Concept 7 route from OTTC would use a route similar to the current San Diego Flyer and would operate with 10-minute headways. The route to OTTC would travel around the airport in mixed traffic along Airport Terminal Road with stops at Terminal 1 and Terminal 2. From the SDIA entrance, the route would travel in a dedicated transit-only lane before turning north to continue along Laurel Street in mixed traffic. This Concept 7 route would turn northwest on Pacific Highway to travel in a dedicated transit-only lane to connect to the existing OTTC, providing connections to the Trolley Blue and Trolley Green Lines, Amtrak Pacific Surfliner, COASTER, and buses.

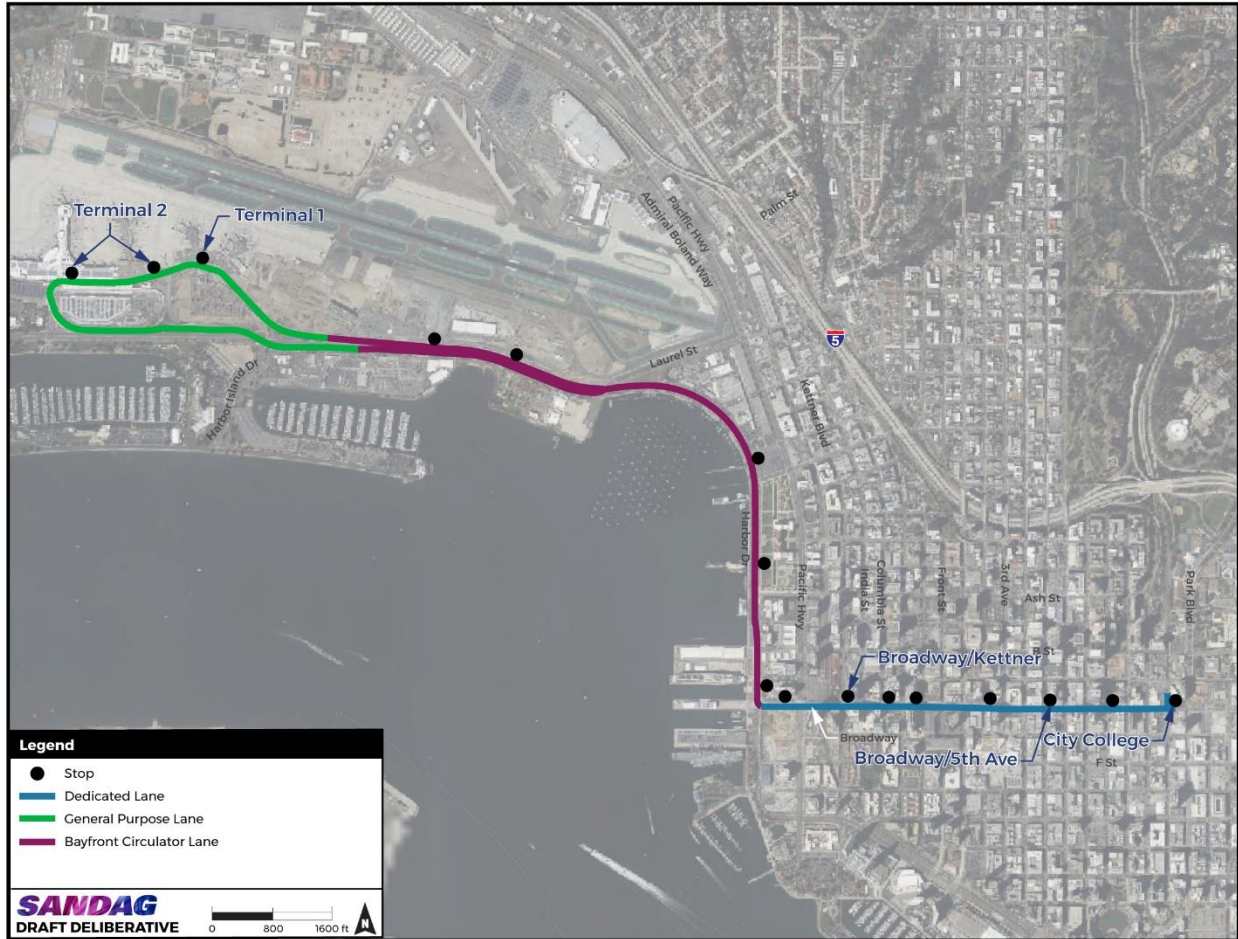
Table 3-14. Concept 7 Characteristics

CHARACTERISTIC	ROUTE TO CITY COLLEGE	ROUTE TO OLD TOWN TRANSIT CENTER
Length in transit-only lanes (miles)	3	3.2
Length in mixed traffic (miles) ¹	0	0.4
Number of stops	16	3
Headways	7.5 minutes	10 minutes

Source: WSP, HDR 2022

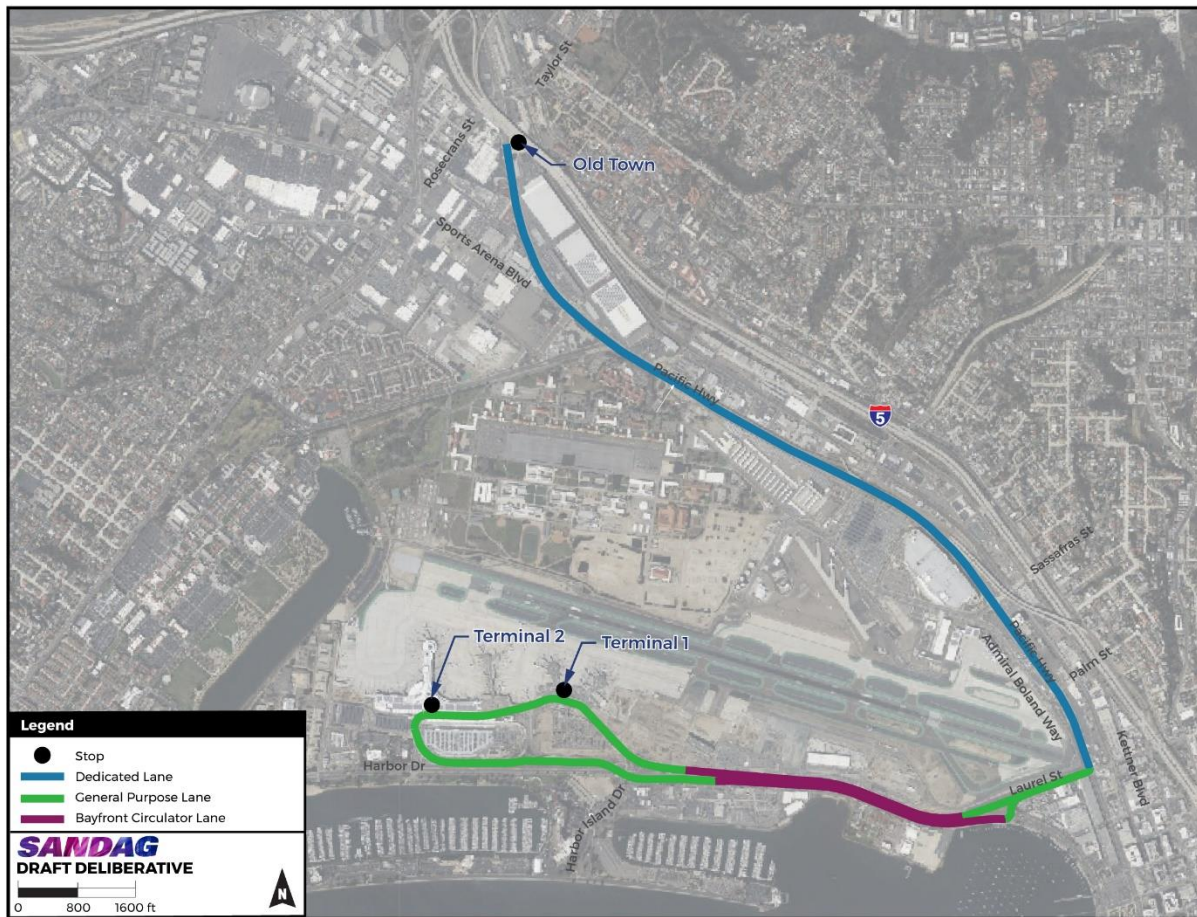
Notes: ¹ The length of the alignment includes the portion along local streets. The route from City College and the OTTC would also operate in mixed traffic on SDIA property.

Figure 3-15. Bus Concept – San Diego International Airport to City College



Source WSP, HDR 2023

Figure 3-16. Bus Concept – San Diego International Airport to Old Town Transit Center



Source: WSP, HDR 2023

3.2. Concepts Considered and Eliminated

Other airport connection concepts were evaluated in previous studies and have been eliminated from further consideration:

- ATC from SDIA to Navy Old Town Campus
- ATC from SDIA to Intermodal Transportation Center Site

Appendix Q describes these concepts and the reasoning for their elimination.

3.3. Potential Future Extensions

Public comments generated in response to the April 2021 NOP and coordination with stakeholders suggested examination of other connections to SDIA, including Liberty Station, the Midway District/Sports Arena, and Point Loma. While these locations are not evaluated as part of this study, the proposed concepts that are evaluated would not preclude a future extension to any of these locations for ATC, Trolley, or bus.

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4. EVALUATION CRITERIA

The criteria used for the evaluation of concepts are grouped into six key categories, which are the same categories presented in the *Airport Connectivity Analysis* (San Diego Association of Governments [SANDAG] 2019):

- Passenger Convenience and Ridership
- Congestion of Airport Access
- Vehicle Miles Traveled (VMT) and Greenhouse Gases (GHG)
- Feasibility/Complexity
- Cost
- Community Effects and Economic Benefits

Each category consists of one or more criteria that were developed to assess each concept studied in this report quantitatively and qualitatively. Table 4-1 presents and describes the evaluation criteria. All criteria were viewed as being equal in importance. Detailed information for each evaluation criterion is included in Appendix R.

Table 4-1. Evaluation Criteria

EVALUATION CRITERIA	CRITERIA ELEMENTS	DESCRIPTION
PASSENGER CONVENIENCE AND RIDERSHIP		
Regional Connectivity	Modes of Transportation that Connect at Each Station	The number of existing transportation modes and routes available for connections within a 0.5-mile buffer of proposed stations for each concept which represents a typical walk distance. The modes of transit include those operated by MTS, SDIA, NCTD, and Amtrak. Connections to bicycle facilities, multimodal paths, and arterials.
	Connections to Destinations	The number of destinations that can be reached by each concept per station within a 0.5-mile buffer of the station without requiring a transfer to another mode to complete the trip. "Destinations" include tourist destinations (e.g., attractions, museums, commercial shopping areas, recreational/historic areas), and community facilities (e.g., schools, parks, libraries, police/fire stations, hospitals).

EVALUATION CRITERIA	CRITERIA ELEMENTS	DESCRIPTION
User Experience	Drop-Off/Pick-Up and Navigation and Transfer Convenience	Distance of access between the proposed station and transfers and drop-off/pick-up areas. Simplicity of access and ease of navigation.
	Station Amenities	Shelters, seating, lighting, trash receptacles, and other features.
	Fare Payment Method	Ease of fare payment (e.g., off-vehicle ticketing which takes less time and allows all-door boarding vs. on-vehicle fare payment).
	Boarding Method	Ease of boarding (e.g., level boarding that allows passengers to roll on and off with luggage vs. navigating stairs).
	Luggage Accommodations	On-board space and circulation experience for travelers with luggage.
	Reliability	Ability to maintain scheduled headways with minimal interruptions or delays.
	Ride Comfort	Smoothness, minimal stopping and starting.
Travel Time	Transit Travel Time	The total time spent traveling from the first transit boarding to the destination, inclusive of transfers. Travel time was obtained from the SANDAG ABM2+ model.
	Headways	The amount of time between transit vehicle arrivals.
Ridership	Ridership	Projected ridership in 2050 for each concept (total line and by station) and systemwide based on forecasts from the SANDAG ABM2+ model.
CONGESTION OF AIRPORT ACCESS		
Traffic Effect	Percent Change in Roadway Volumes on Select Roads during Operation	The 2050 ADT on select roadway segments (Figure 4-1) for each concept were compared to the No Project baseline to determine the percent change in ADT (increase or decrease). ADT represents the average number of vehicles passing a specific point on a connection or roadway on an average day. ADT was extracted from the SANDAG ABM2+ model.
VMT AND GHG		
VMT	Regional VMT	The change in 2050 regional VMT associated with providing a new transit option. The VMT for each concept was compared against a No Project baseline to calculate the change in VMT associated with implementation of that concept. VMT was extracted from the SANDAG ABM2+ model.

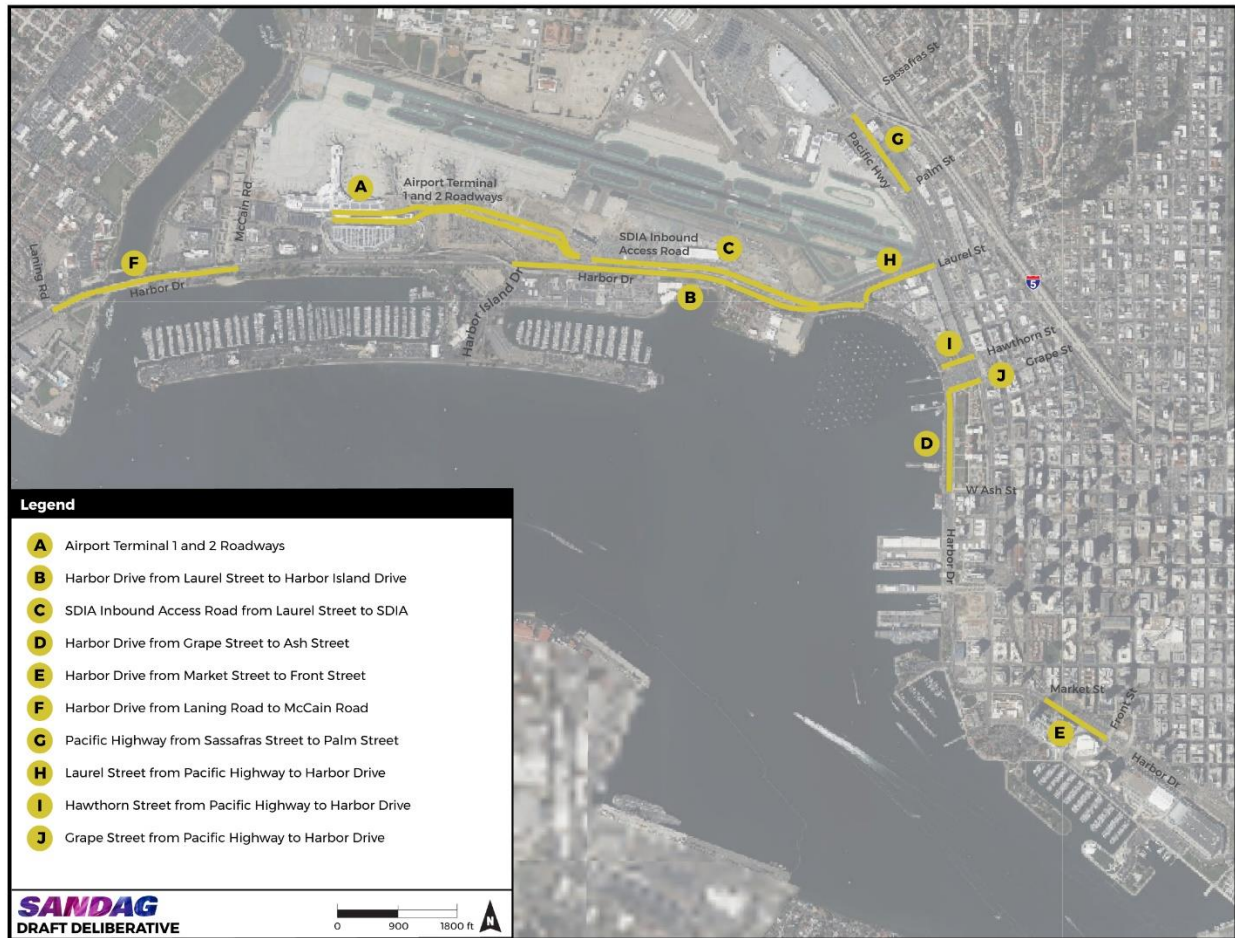
EVALUATION CRITERIA	CRITERIA ELEMENTS	DESCRIPTION
GHG	GHG Compared to No Project	A select link analysis was performed within the SANDAG ABM2+ model. The VMT on the select links was compared to the No Project baseline to calculate the change in VMT. EMFAC per mile emission rates in pollutant per mile traveled units were calculated for each concept and the No Project baseline.
FEASIBILITY / COMPLEXITY		
Right-of-Way	Affected Parcels	The number of parcels located within a buffer from the centerline of the nearest rail line (20 feet for aerial and at-grade, 20 feet for tunnel/cut-and-cover, 20 feet at stations, and 10 feet from edge of straddle bents) that may need to be acquired to support the concept.
	Demolition of Buildings	The number of buildings potentially requiring demolition within a buffer, as described above.
Construction Effects/ Constructability	Construction Effects and Constructability	Analysis of the constructability considerations associated with each concept, including construction access and staging needs, traffic handling or detour scenarios, and potential effects on existing LOSSAN and LRT tracks and service, as applicable, that would be required to construct each concept.
Major Utilities	Type and Number of Utilities	Identification of major utilities located within a buffer, defined as: a 10-foot diameter from column and straddle bent locations for aerial alignments, 20 feet from track centerline for at-grade and cut-and-cover alignments, 20 feet at stations, and within the limits of the launch and retrieval sites for tunnel boring machines. "Major Utilities" is categorized as water facilities equal to or greater than 16 inches, sewer facilities equal to or greater than 18 inches, and storm drain facilities equal to or greater than 36 inches.
Geotechnical, Seismic Conditions	Geotechnical and Seismic Conditions	Major risk/challenges related to the geotechnical and seismic conditions (active faults, ground conditions) associated with implementation of each concept.
Regulatory Considerations	Regulatory Considerations	The number of agency approvals, permitting requirements, and potential coordination efforts required for each concept.

EVALUATION CRITERIA	CRITERIA ELEMENTS	DESCRIPTION
COST		
Capital Cost	Capital Costs in 2022 Dollars	Prototypical Unit Price Elements were developed to represent anticipated guideway configurations (i.e., aerial, at-grade, and/or tunnel), stations, maintenance facilities, and enabling work. Additionally, station and roadway improvements necessary to implement the Enhanced Bus Service option are provided. High-level estimates for vehicle acquisitions and allowances for professional services are also included. Real estate acquisition costs are excluded from the capital cost estimates.
Cost/Rider	Cost per Rider	Cost per rider based on capital cost (as described above) and 2050 projected ridership on the concept. For purposes of the analysis, an annualization factor was applied to the daily ridership to calculate annual ridership. The capital cost was also annualized.
Cost/Mile	Cost per Mile	Cost per mile based on capital cost (as described above) and length of the concept.
Operations and Maintenance	O&M Costs	A high-level comparative assessment that considers the main O&M cost elements.
COMMUNITY EFFECT AND ECONOMIC BENEFITS		
Community Effects	Surrounding Communities and Neighborhoods Served	The number of communities and/or neighborhoods (per boundaries defined in City of San Diego community plans) that each concept would serve within a 0.5-mile buffer from each station.
	Population and Housing	The population and number of households within a 0.5-mile buffer from each station.
	Jobs and Employment	The number of jobs within a 0.5-mile buffer of the station for each concept.
	Commuting Origins	The percentage of workers, including SDIA workers, who travel from the north, south, and east to reach areas within a 0.5-mile buffer of stations along the concept.
Adjacent Development Considerations	Redevelopment Opportunities Based on Vacant Properties	The potential for redevelopment based on the number of vacant properties measuring at least 20,000 square feet within a 0.5-mile buffer from each station per concept.

Source: WSP, HDR, GPM, and TAHA 2022

Notes: ADT = average daily traffic; ABM = Activity Based Model; EMFAC = Emission Factors; GHG = greenhouse gases; LOSSAN = Los Angeles–San Diego–San Luis Obispo Rail Corridor; LRT = light rail transit; MTS = Metropolitan Transit System; NCTD = North County Transit District; O&M = operations and maintenance; SANDAG = San Diego Association of Governments; SDIA = San Diego International Airport; VMT = vehicle miles traveled

Figure 4-1. Roadway Segments



Source: WSP, HDR 2022

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5. EVALUATION OF CONCEPTS

This section presents the evaluation of the three transportation modes—Airport Transit Connector (ATC), San Diego Trolley (Trolley) (Concept 6), and bus (Concept 7)—using the criteria described in Chapter 4 and Appendix R. For the ATC mode, Concepts 3 through 5, inclusive of concept variations, are evaluated in this chapter. ATC connections both north and south of San Diego International Airport (SDIA) would provide important advantages for regional connectivity. A north connection to the Port Transit Center (PTC) and Consolidated Rental Car Center (CONRAC) would allow for a transit connection between SDIA and Port destinations, while the south alignment would connect to future and planned transit facilities in the region’s urban core. Therefore, for purposes of this analysis, evaluation is performed on the ATC concepts that include both a north and south route. Specifically, analysis of Concepts 3 through 5 includes evaluation of both (1) the relevant south route and (2) a north route. Concept 1A was selected as the common north route as it would serve both the PTC and CONRAC without precluding a future extension to the Old Town Transit Center (OTTC) or the inclusion of a direct access ramp to and from Interstate (I-) 5 or Los Angeles–San Diego–San Luis Obispo Rail Corridor (LOSSAN) platforms at the PTC. Therefore, the evaluation of Concepts 3 through 5 is inclusive of Concept 1A.

Detailed information on the evaluation of each criterion for Concepts 3 through 7 is included in Appendices E through O. The evaluation of criteria for the standalone north route ATC concepts (Concepts 1 and 2) described in Section 3.1 is provided in Appendices A through D. Each appendix has been prepared to provide a standalone evaluation for that concept unless otherwise noted.

As described in Chapter 2, the purpose of this study is to develop and evaluate concepts to create a regional transit connection to SDIA as part of the Central Mobility Hub (CMH) Project. This study is not intended to determine the alternatives that will advance to the environmental clearance process. Therefore, other variations of the concepts included in this study, including a south-route-only ATC concept, could be identified and advanced as part of the environmental clearance phase. Appendix S presents a summary of the evaluation for a south-route-only concept from SDIA to the Civic Center.

5.1. Passenger Convenience and Ridership

The evaluation of passenger convenience and ridership considered regional connectivity, user experience, travel time, and ridership.

5.1.1. Regional Connectivity

The regional connectivity evaluation criterion identifies the modes of transportation and major destinations and community facilities travelers can access at stations along the concept without needing to transfer to another mode of transportation to complete the trip. A 0.5-mile buffer from each station was used for the evaluation, which represents a typical walk distance.

Modes of Transportation. The number of connections to different modes of transportation within a 0.5-mile buffer of each station for each concept is shown in Table 5-1. Concepts 3 through 7 would have connections to the regional transit network, including the Metropolitan Transit System (MTS) bus, San Diego Trolley (Trolley), Amtrak intercity rail, and COASTER commuter rail. All concepts would have the same number of connections to the Trolley, Amtrak, and COASTER. In addition, the concepts would have access to bike routes and major roadways to continue travel to surrounding destinations.

Table 5-1. Regional Connectivity

CONCEPT DESCRIPTION		BUS TRANSIT ROUTES	TROLLEY/ RAIL LINES	BIKE ROUTES	MAJOR ROADWAYS/ COLLECTOR STREETS	MAJOR DESTINATIONS
ATC to PTC/CONRAC and Santa Fe Depot	Concept 3A Aerial	16	5	7	23	49
	Concept 3B Bored Tunnel	16	5	7	25	44
	Concept 3C Hybrid	16	5	7	23	49
ATC to PTC/CONRAC and Convention Center	Concept 4A Aerial	19	5	9	32	63
	Concept 4B Bored Tunnel	19	5	9	34	67
	Concept 4C Hybrid	19	5	9	32	63
ATC to PTC/CONRAC and Civic/Core	Concept 5A Aerial	19	5	7	28	59
	Concept 5B Bored Tunnel	19	5	7	31	63
	Concept 5C Hybrid	19	5	7	28	59
Trolley	Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	20	5	7	30	65
Enhanced Bus	Concept 7 Bus Concept from SDIA to Old Town Transit Center and City College	28	5	8	34	74

Source: WSP, HDR, and TAHA 2022

Notes: The station area is defined as a 0.5-mile buffer from the station centroid. Given the alignment for the Concept 3-5 tunnel variations, the optional County Administration Building ATC Station is located east of the station location for the aerial and hybrid variations; therefore, the Concept 3-5 tunnel variations serve a different number of destinations than the aerial and hybrid variations.

ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; SDIA = San Diego International Airport

Connections to Destinations. Concepts 3 through 7 would provide regional connections to multiple destinations and community facilities within a 0.5-mile buffer of each station, as shown in Table 5-1. Connections include major tourist destinations (e.g., attractions, museums, commercial shopping areas, recreational/historic areas) and community facilities (e.g., schools, parks, libraries, police/fire stations, hospitals).

5.1.2. User Experience

The evaluation of user experience relates to the station area environment and a passenger's experience on the vehicle considering elements such as ease of drop-offs and pick-ups, transfers, navigation, and passenger comfort.

Drop-off/pick-up, navigation, and transfer convenience. Under Concepts 3 through 5, inclusive of the concept variations, the Santa Fe Depot ATC Station would have limited but available drop-off/pick-up areas and adjacent parking areas, while the PTC would have a dedicated vehicular drop-off/pick-up area. For Concept 6, drop-off and pick-up areas are limited other than at Santa Fe Depot. For Concept 7, vehicular drop-off/pick-up locations are limited and challenging in the downtown area, with the exception of Santa Fe Depot, but would be more easily accommodated at the OTTC.

Concepts 3 through 6 would provide wayfinding signage at new stations for navigation and connections to other modes of travel and nearby destinations to minimize traveler confusion. Passengers traveling to SDIA would need to select the correct train, and clear signage depicting the routes would be needed. Concepts 6 and 7 would use wayfinding at existing stations and stops in addition to providing new wayfinding signage. Concept 6 would serve six existing Trolley stations that would also be served by the Trolley Blue and/or Green Lines. Passengers boarding at an existing Trolley Blue or Green Line Station to travel to SDIA would need to select the correct train, as the Trolley Blue and Green Lines currently continue north at the County Center/Little Italy Station.

Each concept would support transfers to MTS bus routes and rail lines (i.e., Trolley Blue, Orange, and Green Lines, Amtrak, and COASTER) with minimal walking distance to these connections. Concepts 3 through 6 would provide a connection to SDIA at Terminal 1 and Terminal 2 with a minimum walk of 5 minutes from the transit-ready area where the SDIA Station is located to the nearest entrance at each terminal. Concept 7 would provide a connection to SDIA with a stop in front of an entrance at each terminal, providing a shorter walk time.

Station amenities, fare payment methods, boarding methods. Concepts 3 through 5 are assumed to be fare free and would provide level boarding (step or roll directly onto the vehicle without a step up or down) that would provide passengers an easy and smooth boarding experience. In addition, the ATC vehicles would be designed for short trips and luggage. Concept 6 would have off-vehicle ticket vending machines and PRONTO card validators at the platform, which allows fare payment prior to boarding a Trolley vehicle. Access onto the Trolley vehicle is typically a step up from the platform onto the train. Traveling with luggage may be challenging as Trolley vehicles are not specifically designed for passengers with luggage. Concept 7 is assumed to be fare free and it is assumed new bus vehicle types would be purchased to better accommodate luggage compared to current buses, although traveling with

luggage may be challenging. In addition, access to a bus is generally not at the same level as the curb and requires deployment of a ramp for wheelchair users.

Reliability and Ride Comfort. Concepts 3 through 5 would operate in a dedicated right-of-way with no shared operations for the entirety of the ATC alignment, minimizing potential conflicts with other vehicles or transit systems. Concept 6 would also operate in a dedicated right-of-way until it interlines with the Trolley Blue and Green Lines, at which point operations and reliability of the airport route could be affected by disruptions along the broader Trolley network or at at-grade crossings along the Blue and Green Lines. Concept 7 would operate in both transit-only lanes and regular vehicle lanes and could be affected by congestion, roadway construction, accidents, and other issues.

Ride comfort considered the amount of starting and stopping along a concept alignment. Concepts 3 through 5 would serve up to five stations along the south route and up to four stations along the north route. Concept 6 would serve up to eight stations. The Concept 7 route to the OTTC would stop at the OTTC and the airport terminals, and the route between SDIA and City College would stop at 16 bus stops.

5.1.3. Travel Time

Transit Travel Time. The evaluation of transit travel time considered the total time spent traveling on transit to and from SDIA and select locations within the county. Transit travel time included time from the first mode of transit used to the destination, inclusive of transfers, and was obtained from the San Diego Association of Governments (SANDAG) ABM2+ model. Total transit travel time included wait time, walk time, and in-vehicle travel time. Transit travel times to SDIA were calculated for the AM peak hour and transit travel times from SDIA were calculated for the PM peak hour. Transit travel times to and from each destination were compared against a No Project baseline. Table 5-2 outlines the transit travel times for Concepts 3 through 7 for each location evaluated.

Table 5-2. Transit Travel Time in Minutes

LOCATION	NO PROJECT BASELINE		CONCEPT 3: ATC TO PTC/CONRAC AND SANTA FE DEPOT		CONCEPT 4: ATC TO PTC/CONRAC AND CONVENTION CENTER		CONCEPT 5: ATC TO PTC/CONRAC AND CIVIC/CORE		CONCEPT 6: TROLLEY FROM SDIA TO 12TH & IMPERIAL TRANSIT CENTER		CONCEPT 7: BUS CONCEPT FROM SDIA TO OLD TOWN TRANSIT CENTER AND CITY COLLEGE	
	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA
Legoland	64	64	61	61	61	61	61	61	63	63	57	57
Carlsbad/Carlsbad Village Station	63	63	53	53	53	53	53	53	61	61	62	62

LOCATION	NO PROJECT BASELINE		CONCEPT 3: ATC TO PTC/CONRAC AND SANTA FE DEPOT		CONCEPT 4: ATC TO PTC/CONRAC AND CONVENTION CENTER		CONCEPT 5: ATC TO PTC/CONRAC AND CIVIC/CORE		CONCEPT 6: TROLLEY FROM SDIA TO 12TH & IMPERIAL TRANSIT CENTER		CONCEPT 7: BUS CONCEPT FROM SDIA TO OLD TOWN TRANSIT CENTER AND CITY COLLEGE	
	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA
Grossmont Center Mall	61	61	41	41	41	41	41	41	49	49	43	43
Mission Bay/Mission Bay Park	32	32	18	18	18	18	18	18	35	35	21	21
Mission Valley/Fashion Valley Station	36	36	19	19	19	19	19	19	13	13	23	23
Chula Vista City Hall	45	45	42	42	42	42	41	41	43	43	51	51
Bayfront Redevelopment/E Street Station	45	45	40	40	40	40	39	39	45	45	55	55
Bayfront Redevelopment (Gaylord Pacific Resort and Convention Center & Harbor Park)	47	47	42	42	42	42	40	40	36	36	57	57
San Ysidro Transit Center	60	60	36	36	36	36	36	36	38	38	57	57
San Diego State University/SDSU Transit Center	52	52	32	32	32	32	32	32	32	32	28	28
University of California, San Diego/UCSD Central Campus Station	41	41	29	29	29	29	29	29	38	38	30	30
Convention Center	24	24	20	20	14	14	20	20	19	19	28	28

LOCATION	NO PROJECT BASELINE		CONCEPT 3: ATC TO PTC/CONRAC AND SANTA FE DEPOT		CONCEPT 4: ATC TO PTC/CONRAC AND CONVENTION CENTER		CONCEPT 5: ATC TO PTC/CONRAC AND CIVIC/CORE		CONCEPT 6: TROLLEY FROM SDIA TO 12TH & IMPERIAL TRANSIT CENTER		CONCEPT 7: BUS CONCEPT FROM SDIA TO OLD TOWN TRANSIT CENTER AND CITY COLLEGE	
	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA	TO SDIA	FROM SDIA
Liberty Station (Commercial & Bus Transit)	23	23	17	17	16	16	16	16	24	24	18	18
Ocean Beach (Downtown Area)	41	41	18	18	18	18	18	18	24	24	25	25

Source: SANDAG, WSP, and HDR 2022

Notes: ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; PTC = Port Transit Center; SDIA = San Diego International Airport; San Diego State University; UCSD = University of California San Diego

Headways. Headways, or the time between transit vehicles, was also evaluated, as this determines a user's expected wait time to the next transit departure. The headways presented in this evaluation (Table 5-3) are consistent with those used in the ridership forecasts. Actual headways would be determined during later stages of project development.

Table 5-3. Headways

CONCEPT DESCRIPTION	MINIMUM/SHORTEST HEADWAYS
Concept 3: ATC to PTC/CONRAC and Santa Fe Depot	4 minutes ¹
Concept 4: ATC to PTC/CONRAC and Convention Center	4 minutes ¹
Concept 5 ATC to PTC/CONRAC and Civic/Core	4 minutes ¹
Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	15 minutes ²
Concept 7 Bus (Route to City College)	7.5 Minutes
Concept 7 Bus (Route to Old Town Transit Center)	10 Minutes

Source: SANDAG, WSP, and HDR 2022

Notes: ¹Headways would be two minutes where Concept 5B and Concept 1A interline (i.e., from SDIA to the point where the south route spurs off the north route between the Harbor Island (Optional) Station and PTC).

²Shorter headways may be feasible but could require modifications to existing Trolley infrastructure for the portions of the alignment where the SDIA Trolley route would interline with the Trolley Green and Blue Lines. Such modifications could be considered in future studies.

ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; PTC = Port Transit Center; SDIA = San Diego International Airport

5.1.4. Ridership

Projected ridership in 2050 was modeled for each concept for the entirety of the line, by station, and systemwide (all transit lines combined) based on forecasts from the SANDAG ABM2+ model. Table 5-4 summarizes the projected ridership for each concept. Ridership by station for Concepts 3 through 6 is included in Appendices E through N, presenting the boardings, alightings, and passengers on vehicles between stations.

Table 5-4. 2050 Ridership

CONCEPT DESCRIPTION	DAILY RIDERSHIP ON CONCEPT ¹	TOTAL REGIONAL BOARDINGS
Concept 3: ATC to PTC/CONRAC and Santa Fe Depot	46,000	1,433,000
Concept 4: ATC to PTC/CONRAC and Convention Center	48,000	1,433,000
Concept 5: ATC to PTC/CONRAC and Civic/Core	50,000	1,434,000
Concept 6: Trolley from SDIA to 12th & Imperial Transit Center	14,000	1,415,000
Concept 7: Bus Concept from SDIA to Old Town Transit Center and City College	9,000	1,392,000

Source SANDAG 2022

Notes: ¹Numbers are rounded to the nearest 1,000.

ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; PTC = Port Transit Center; SDIA = San Diego International Airport

5.2. Congestion of Airport Access

5.2.1. Traffic Effects

Residents, employees, and visitors primarily rely on automobiles (whether private or rideshare) or bus transit to access SDIA, with access via local roads. There are limited access routes to and from SDIA for auto-based traffic with the primary roadways including Harbor Drive, Hawthorn Street, Grape Street, Kettner Boulevard, India Street, Laurel Street, and Pacific Highway. The 2050 average daily traffic (ADT) volumes on select roadways for each concept were compared against a No Project baseline to calculate the percent change in ADT that could occur with implementation of that concept. By introducing a new transportation option, travelers may switch modes and/or points of access to reach destinations served by each concept, particularly if the new option provides a travel time savings. The percent change in ADT for each roadway segment is presented in Table 5-5.

Table 5-5. Traffic Effects

ROADWAY SEGMENT	PERCENT CHANGE IN AVERAGE DAILY TRAFFIC COMPARED TO NO PROJECT BASELINE				
	CONCEPT 3: ATC TO PTC/CONRAC AND SANTA FE DEPOT	CONCEPT 4: ATC TO PTC/CONRAC AND CONVENTION CENTER	CONCEPT 5: ATC TO PTC/CONRAC AND CIVIC/CORE	CONCEPT 6: TROLLEY FROM SDIA TO 12TH & IMPERIAL TRANSIT CENTER	CONCEPT 7: BUS CONCEPT FROM SDIA TO OLD TOWN TRANSIT CENTER AND CITY COLLEGE
Airport Terminal 1 and 2 Roadways	-26%	-26%	-26%	-10%	-7%
Harbor Drive from Laurel Street to Harbor Island Drive	-10%	-9%	-10%	-4%	-2%
SDIA Inbound Access Road from Laurel Street to SDIA	-26%	-26%	-26%	-10%	-8%
Harbor Drive from Grape Street to Ash Street	-7%	-8%	-8%	-4%	-3%
Harbor Drive from Market Street to Front Street	-1%	-2%	0%	-1%	-1%
Harbor Drive from Laning Road to McCain Road	-2%	-3%	-4%	-2%	2%
Pacific Highway from Sassafras Road to Palm Street	-13%	-13%	-13%	-4%	-8%
Laurel Street from Pacific Highway to Harbor Dr	-22%	-22%	-23%	-11%	-10%
Hawthorn Street from Pacific Highway to Harbor Drive	8%	9%	8%	15%	16%
Grape Street from Pacific Highway to Harbor Drive	-7%	-6%	-7%	-4%	1%

Source: SANDAG, WSP, and HDR 2022

Note: SDIA = San Diego International Airport; CONRAC = Consolidated Rental Car Center; PTC = Port Transit Center.

5.3. Vehicle Miles Traveled and Greenhouse Gases

This criterion evaluates the change in 2050 regional vehicle miles traveled (VMT) associated with providing a new transit option in the San Diego region and the corresponding change in 2050 greenhouse gas (GHG) emissions, both of which were outputs from the SANDAG ABM2+ model. VMT and GHG emissions are closely correlated, with more miles traveled resulting in higher emissions. As such, both metrics have the same relative trends.

5.3.1. VMT

Table 5-6 summarizes the 2050 regional VMT and change in VMT for each concept compared to a No Project baseline.

Table 5-6. Vehicle Miles Traveled

CONCEPT DESCRIPTION	2050 REGIONAL VMT ¹	REGIONAL VMT CHANGE FROM NO PROJECT ¹
No Project Baseline	88,620,000	—
Concept 3: ATC to PTC/CONRAC and Santa Fe Depot	88,550,000	-70,000
Concept 4: ATC to PTC/CONRAC and Convention Center	88,550,000	-70,000
Concept 5 ATC to PTC/CONRAC and Civic/Core	88,491,000	-129,000
Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	88,569,000	-51,000
Concept 7 Bus Concept from SDIA to Old Town Transit Center and City College	88,598,000	-22,000

Source: SANDAG, WSP, and HDR 2022

Notes: ¹Numbers are rounded to the nearest 1,000

ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; PTC = Port Transit Center; SDIA = San Diego International Airport; VMT = vehicle miles traveled

5.3.2. GHG

The evaluation of GHG considered the change in GHG emissions in the region as a result of a reduction of VMT. GHG emissions are released through the exhaust of combusted engine fuel when vehicles travel along the roadway network. Table 5-7 summarizes the change in GHG for each concept.

Table 5-7. Operational GHG Emissions

CONCEPT DESCRIPTION	GHG EMISSIONS (MMTCO ₂ E) (TONS PER DAY) ¹	PERCENT CHANGE IN GHG
No Project Baseline	24,590	—
Concept 3: ATC to PTC/CONRAC and Santa Fe Depot	24,480	-0.47%
Concept 4: ATC to PTC/CONRAC and Convention Center	24,430	-0.67%
Concept 5 ATC to PTC/CONRAC and Civic/Core	24,370	-0.91%
Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	24,390	-0.83%
Concept 7 Bus Concept from SDIA to Old Town Transit Center and City College	24,430	-0.65%

Source: SANDAG, WSP, HDR, and TAHA 2022

¹Numbers are rounded to the nearest 10.

Notes: ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; GHG = greenhouse gas; MMTCO₂e = million metric tons of CO₂e; PTC = Port Transit Center; SDIA = San Diego International Airport

5.4. Feasibility / Complexity

The evaluation of feasibility/complexity included right-of-way considerations, construction effects/constructability, potential conflicts with existing major utilities, geotechnical and seismic considerations, and regulatory considerations.

5.4.1. Right-of-Way

The evaluation of right-of-way requirements considered the number of parcels that may require acquisition to support each concept, considering full and partial acquisitions, including the number of buildings that may require demolition. As described in Table 4-1, a buffer from project elements was established, and parcels and buildings within that buffer were identified to determine potential right-of-way requirements. Right-of-way requirements for each concept are shown in Table 5-8.

Table 5-8. Right-of-Way Requirements

CONCEPT DESCRIPTION		RIGHT-OF-WAY REQUIREMENTS	
		NUMBER OF PARCELS AFFECTED	NUMBER OF POTENTIAL BUILDINGS FOR DEMOLITION
ATC to PTC/CONRAC and Santa Fe Depot	Concept 3A Aerial	30	9
	Concept 3B Bored Tunnel	36	9
	Concept 3C Hybrid	29	9
ATC to PTC/CONRAC and Convention Center	Concept 4A Aerial	34	10
	Concept 4B Bored Tunnel	46	9
	Concept 4C Hybrid	39	9
ATC to PTC/CONR AC C and Civic/Core	Concept 5A Aerial	37	9
	Concept 5B Bored Tunnel	37	9
	Concept 5C Hybrid	30	9
Trolley	Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	11	4
Enhanced Bus	Concept 7 Bus Concept from SDIA to Old Town Transit Center and City College	0	0

Source: WSP, HDR, and GPM 2022

Notes: ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; SDIA =San Diego International Airport

5.4.2. Construction Effects/Constructability

Constructability considerations include general construction methods, staging and laydown areas, construction sequencing, excavation hazards, traffic handling and detours, and potential effects to the LOSSAN and light rail transit (LRT) tracks and service, as applicable.

Concepts 3 through 5, inclusive of concept variations, would require complex construction with at-grade, aerial, and cut-and-cover tunnel activities. Constructability considerations would be influenced by the length of each alignment (refer to Chapter 3 for the length of each alignment). Construction restrictions for the portions of the ATC concepts located within the SDIA or Runway Protection Zone (RPZ) would affect the complexity and potentially the duration of construction. In addition, proximity to the airport’s sensitive equipment would have to be considered and coordinated with the airport, which may limit construction means and methods that generate significant amounts of ground vibration.

Concepts 3B, 3C, 4B, 4C, 5B, and 5C would include bored tunnel activities that would affect the complexity of construction. However, bored tunnel activities may avoid traffic impacts common to cut-and-cover construction, except where surface disruptions are required (e.g., at stations and at TBM launch and receiving locations).

Concept 6 would require complex construction with at-grade, aerial, and cut-and-cover tunnel activities. The overhead catenary system would dictate the height of the tunnel, the depth of the cut-and-cover segment, and the length of the at-grade transition to the aerial guideway. Concept 6 would require a connection of the new LRT guideway with the existing Trolley Green and Blue Lines that would involve construction of a complex grade separation under the existing LOSSAN tracks in highly constrained site conditions of a busy rail corridor. A shoofly track would be required, which could constrain the throughput capacity of the LOSSAN corridor, adversely impacting frequency of passenger rail service during the construction period and potentially impacting BNSF Railway freight rail operations in the corridor. Additionally, redevelopment is proposed on the property fronting Hawthorn Street and California Street where the Trolley concept would diverge from the mainline tracks. Construction of this concept after the redevelopment has been implemented would be more complex due to likely restricted construction access and lack of staging areas. Concept 6 would interline and modify the existing Blue and Green Trolley trench structure, requiring realignment of direct fixation tracks that would impact passenger rail service and a prolonged suspension of Trolley service on both the Green and Blue Lines in this segment of the LRT system. Additionally, Concept 6 would pass underneath a 108-inch-diameter sewer-interceptor pipeline, which is owned and operated by the City of San Diego. This important sanitary sewer pipeline would have to be supported in place with a shoring system, which would have a high degree of complexity given the size of the utility.

Concept 7 would operate within existing street right-of-way. Construction required for the concept would largely consist of traffic signaling upgrades, intersection and lane reconfigurations, pavement repair or replacement in some areas, and limited ramp or lane construction to connect transit-only lanes. It would also include sidewalk and bus stop reconstruction, and drainage improvements where required.

5.4.3. Major Utilities

Potential conflicts with existing major utilities were identified for each concept. Major utilities in this evaluation are defined as water facilities equal to or greater than 16 inches, sewer facilities equal to or greater than 18 inches, and storm drain facilities equal to or greater than 36 inches. As described in Table 4-1, a buffer from project elements was established to identify major utilities that could be affected by the concept. Table 5-9 summarizes the number and type of major utilities that may be affected as a result of each concept.

Table 5-9. Major Utilities

CONCEPT DESCRIPTION		NUMBER OF MAJOR UTILITIES			
		SEWER	WATER	STORM DRAIN	TOTAL
ATC to PTC/CONRAC and Santa Fe Depot	Concept 3A Aerial	5	5	5	15
	Concept 3B Bored Tunnel	5	7	5	17
	Concept 3C Hybrid	4	6	5	15
ATC to PTC/CONRAC and Convention Center	Concept 4A Aerial	6	8	7	21
	Concept 4B Bored Tunnel	5	8	10	23
	Concept 4C Hybrid	4	7	11	22
ATC to PTC/CONRAC and Civic/Core	Concept 5A Aerial	5	5	5	15
	Concept 5B Bored Tunnel	6	8	5	19
	Concept 5C Hybrid	5	7	5	17
Trolley	Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	1	7	2	10
Enhanced Bus	Concept 7 Bus Concept from SDIA to Old Town Transit Center and City College	0	0	0	0

Source: WSP, HDR, GPM, TAHA 2022

Notes: ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; SDIA = San Diego International Airport

5.4.4. Geotechnical and Seismic Conditions

This criterion evaluated the geotechnical and seismic conditions that may pose risks and challenges to the implementation of each concept. The evaluation considered the following geotechnical/seismic conditions as they were deemed to pose the greatest risk to implementation if present:

- Upper soil competency
- Depth to competent soft rock
- Active faulting potential

- Liquefaction potential
- Lateral spreading potential

These conditions have different effects depending on the alignment type (whether an alignment is at-grade, aerial, or underground). For instance, at-grade, aerial, and cut-and-cover alignments are generally more affected by upper soil competency, whereas depth to competent soft rock has a greater effect on bored underground alignments. These conditions are typically addressed using established engineering practices, such as specialized structural and geotechnical design and potential ground improvement solutions. However, structures intended for human occupancy need to be offset from the active fault trace by a minimum distance of 25 feet on each side or more, as determined by the project geologist and as regulated by the Alquist-Priolo Act. Therefore, if active faults are present, the location of structures such as stations would need to be revised to comply with the offset requirements.

There would be a medium favorability for Concepts 3A, 4A, and 5A when considering geotechnical and seismic conditions along each concept and how those conditions would affect the alignment configuration, which is primarily aerial. Geotechnical and seismic conditions for Concepts 3B, 3C, 4B, 4C, 5B, and 5C, which include aerial, cut-and-cover, and bored tunnel configurations, would have medium-low favorability.

Concepts 3, 4, and 5, inclusive of all variations, would have a low possibility of active faulting from Pacific Highway to Santa Fe Depot, as this segment of the alignment would not require active fault crossings. Concepts 4 and 5 would have high active faulting potential from Santa Fe Depot to the Convention Center and from Santa Fe Depot to the Civic Center, respectively, due to active fault crossings at the Pacific Coast Highway and San Diego Faults.

Concept 6 would have a low favorability when considering geotechnical and seismic conditions and alignment configuration. There would be high active faulting potential for the underground segments along Harbor Drive and Hawthorn Street and the at-grade and aerial segments on Harbor Drive.

Geotechnical and seismic considerations are not anticipated to affect implementation of Concept 7 because it does not include construction of new structures or other types of improvements that are sensitive to geotechnical and seismic conditions. Table 5-10 summarizes the geotechnical and seismic favorability and active faulting potential for each concept.

Table 5-10. Geotechnical and Seismic Conditions

CONCEPT DESCRIPTION		GEOTECHNICAL AND SEISMIC CONDITIONS FAVORABILITY	ACTIVE FAULTING POTENTIAL
ATC to PTC/CONRAC and Santa Fe Depot	Concept 3A Aerial	Medium	Low
	Concept 3B Bored Tunnel	Medium-low	Low
	Concept 3C Hybrid	Medium-low	Low
ATC to PTC/CONRAC and Convention Center	Concept 4A Aerial	Medium	Low
	Concept 4B Bored Tunnel	Medium-low	Low
	Concept 4C Hybrid	Medium-low	Low
ATC to PTC/CONRA C and Civic/Core	Concept 5A Aerial	Medium	Low
	Concept 5B Bored Tunnel	Medium-low	Low
	Concept 5C Hybrid	Medium-low	Low
Trolley	Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	Low	Low
Enhanced Bus	Concept 7 Bus Concept from SDIA to Old Town Transit Center and City College	N/A	N/A

Source: WSP and HDR, 2023

Notes: ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; PTC = Port Transit Center; SDIA = San Diego International Airport

5.4.5. Regulatory Considerations

The Regulatory Considerations criterion identifies the federal and state agency approvals, permits, and coordination potentially required for implementation of each concept, based on information available to date. Additional approvals and coordination may be identified during subsequent phases of the project development process. All concepts would require environmental clearance pursuant to the California Environmental Quality Act (CEQA), for which SANDAG would be the CEQA lead agency. Additionally, the project would likely have a federal nexus, which would also require environmental clearance pursuant to the National Environmental Policy Act.

Table 5-11 summarizes the regulatory considerations for each concept. Concepts 3 through 6, inclusive of variations, may require permitting and coordination with the Federal Aviation Administration (FAA), California Coastal Commission (CCC), U.S. Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), San Diego County Regional Airport Authority (Airport Authority), California Public Utilities Commission (CPUC), and the Federal Railroad Administration (FRA). Specifically:

- Concepts 3 through 6 would have permanent features within 5,000 feet of FAA facilities and would be required to comply with FAA regulations. In addition, Concepts 3, 4, and 5, inclusive of variations, would require construction within the RPZ, which would result in additional coordination with FAA.
- The alignments would be within the California Coastal Zone as identified by the CCC.
- Due to the presence of the federally endangered California least tern near the southeast property line of the airport, coordination with the USFWS, CDFW, and the Airport Authority would be required.
- Coordination with CPUC and compliance with applicable General Orders would be required as it relates to safety and security of rail transit and other public transit fixed guideway systems.
- FRA coordination would be required for Concepts 3 through 6, but the extent of coordination would vary:
 - Concepts 3, 4, and 5 would provide for a new Santa Fe Depot ATC Station in which new facilities would connect to Amtrak facilities. This would require compliance with FRA regulations and safety statutes of 49 Code of Federal Regulations related to railroad safety.
 - Concept 6 would provide for a new grade separation of LRT and railroad tracks requiring construction within active railroad right-of-way, which would result in additional coordination with FRA.
- Other regulatory considerations include the following:
 - Concepts 3B, 3C, 4B, 4C, 5B, and 5C would include boring construction activities subject to Occupational Safety and Health Administration regulations.
 - Concept 7 would operate within an existing facility and coordination efforts would be minimal. Permitting and coordination with the CCC may be required as the concept proposes an enhanced bus service in transit-only lanes along North Harbor Drive, which may be within the California Coastal Zone as identified by the CCC.

Table 5-11. Regulatory Considerations

	ATC TO PTC/CONRAC AND SANTA FE DEPOT			ATC TO PTC/CONRAC AND CONVENTION CENTER			ATC TO PTC/CONRAC AND CIVIC/CORE			TROLLEY	ENHANCED BUS
	CONCEPT 3A AERIAL	CONCEPT 3B BORED TUNNEL	CONCEPT 3C HYBRID	CONCEPT 4A AERIAL	CONCEPT 4B BORED TUNNEL	CONCEPT 4C HYBRID	CONCEPT 5A AERIAL	CONCEPT 5B BORED TUNNEL	CONCEPT 5C HYBRID	CONCEPT 6	CONCEPT 7
FAA: 14 CFR Chapter 14	•	•	•	•	•	•	•	•	•	•	
FAA: Interim Guidance on Land Uses within a Runway Protection Zone		•			•			•			
CCC: 15 CFR Parts 923 and 930 - Coastal Zone Management Act	•	•	•	•	•	•	•	•	•	•	
CCC: Title 14, Natural Resources Division 5.5, California Coastal Commission	•	•	•	•	•	•	•	•	•	•	•
USFWS: Federal Endangered Species Act	•	•	•	•	•	•	•	•	•	•	
USFWS: Migratory Bird Treaty Act	•	•	•	•	•	•	•	•	•	•	
CDFW: California Endangered Species Act	•	•	•	•	•	•	•	•	•	•	
SDIA Regional Airport Authority Biodiversity Plan	•	•	•	•	•	•	•	•	•	•	

	ATC TO PTC/CONRAC AND SANTA FE DEPOT			ATC TO PTC/CONRAC AND CONVENTION CENTER			ATC TO PTC/CONRAC AND CIVIC/CORE			TROLLEY	ENHANCED BUS
	CONCEPT 3A AERIAL	CONCEPT 3B BORED TUNNEL	CONCEPT 3C HYBRID	CONCEPT 4A AERIAL	CONCEPT 4B BORED TUNNEL	CONCEPT 4C HYBRID	CONCEPT 5A AERIAL	CONCEPT 5B BORED TUNNEL	CONCEPT 5C HYBRID	CONCEPT 6	CONCEPT 7
FRA: 49, CFR Subtitle B, Chapter VII	•	•	•	•	•	•	•	•	•	•	
OSHA: 29 CFR, Subtitle B, Chapter XVII, Part 1926		•	•		•	•		•	•		
CPUC General Orders	•	•	•	•	•	•	•	•	•	•	

Source: WSP, HDR, TAHA 2023

Notes: ATC = Airport Transit Connector; CCC = California Coastal Commission; CDFW = California Department of Fish and Wildlife; CONRAC = Consolidated Rental Car Center; CPUC = California Public Utilities Commission; FAA = Federal Aviation Administration; FRA = Federal Railroad Administration; OSHA = Occupational Safety and Health Administration; PTC = Port Transit Center; SDIA = San Diego International Airport; USFWS = United States Fish and Wildlife Service.

5.5. Cost

This category evaluated criteria related to capital and operations and maintenance (O&M) costs for each concept. Capital cost per rider and cost per mile are also provided to allow for comparisons between each concept given the variation in the length of alignments, number of stations, and destinations served.

5.5.1. Capital Cost

The capital cost for each concept includes anticipated guideway configurations (i.e., aerial, at-grade, and/or tunnel), stations, maintenance facilities, enabling work, vehicle acquisitions, allowances for professional services, and contingency (allocated and unallocated). Additionally, station and roadway improvements necessary to implement the Enhanced Bus Service option are included. The cost estimates are in 2022 dollars and do not include right-of-way costs. Table 5-12 summarizes the capital cost estimates for each concept in a range from low to high and the mid-point.

Table 5-12. Capital Cost

CONCEPT DESCRIPTION		COST IN MILLIONS (2022)		
		LOW	MID-POINT	HIGH
ATC to PTC/CONRAC and Santa Fe Depot	Concept 3A Aerial	\$2,205	\$2,594	\$3,372
	Concept 3B Bored Tunnel	\$3,439	\$4,046	\$5,260
	Concept 3C Hybrid	\$3,039	\$3,576	\$4,648
ATC to PTC/CONRAC and Convention Center	Concept 4A Aerial	\$2,531	\$2,978	\$3,872
	Concept 4B Bored Tunnel	\$4,376	\$5,148	\$6,693
	Concept 4C Hybrid	\$4,194	\$4,935	\$6,415
ATC to PTC/CONRA C and Civic/Core	Concept 5A Aerial	\$2,399	\$2,822	\$3,668
	Concept 5B Bored Tunnel	\$4,120	\$4,847	\$6,301
	Concept 5C Hybrid	\$3,713	\$4,369	\$5,679
Trolley	Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	\$1,145	\$1,347	\$1,751
Enhanced Bus	Concept 7 Bus Concept from SDIA to Old Town Transit Center and City College	\$46	\$54	\$70

Source: WSP, HDR 2022

Notes: ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; SDIA = San Diego International Airport

5.5.2. Cost per Rider

The cost per rider was calculated using 2050 ridership forecasts for the concept from the SANDAG ABM2+ model and capital costs developed for this study to provide a more direct comparison of concepts. Table 5-13 summarizes the cost per rider estimates for each concept. For the purposes of the analysis, an annualization factor was applied to the daily ridership presented in Section 5.1.4 to calculate annual ridership. The capital cost presented in Section 5.5.1 was also annualized.

Table 5-13. Cost Per Rider

CONCEPT DESCRIPTION		COST (2022\$)		
		LOW	MID	HIGH
ATC to PTC/CONRAC and Santa Fe Depot	Concept 3A Aerial	\$4.57	\$5.25	\$6.83
	Concept 3B Bored Tunnel	\$6.12	\$7.04	\$9.15
	Concept 3C Hybrid	\$5.60	\$6.44	\$8.38
ATC to PTC/CONRAC and Convention Center	Concept 4A Aerial	\$5.09	\$5.86	\$7.62
	Concept 4B Bored Tunnel	\$7.47	\$8.59	\$11.17
	Concept 4C Hybrid	\$7.27	\$8.36	\$10.86
ATC to PTC/CONRAC and Civic/Core	Concept 5A Aerial	\$4.65	\$5.34	\$6.95
	Concept 5B Bored Tunnel	\$6.87	\$7.90	\$10.27
	Concept 5C Hybrid	\$6.37	\$7.33	\$9.53
Trolley	Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	\$6.93	\$7.97	\$10.37
Enhanced Bus	Concept 7 Bus Concept from SDIA to Old Town Transit Center and City College	\$0.91	\$1.05	\$1.37

Source: WSP, HDR 2022

Notes: ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; SDIA = San Diego International Airport

5.5.3. Cost per Mile

The cost per mile for each concept was calculated based on the capital cost developed for this study and the length of the concept. Table 5-14 summarizes the cost per mile estimates for each concept.

Table 5-14. Cost Per Mile

CONCEPT DESCRIPTION		COST IN MILLIONS (2022)		
		LOW	MID-POINT	HIGH
ATC to PTC/CONRAC and Santa Fe Depot	Concept 3A Aerial	\$576	\$678	\$881
	Concept 3B Bored Tunnel	\$918	\$1,080	\$1,404
	Concept 3C Hybrid	\$813	\$957	\$1,243
ATC to PTC/CONRA C and Convention Center	Concept 4A Aerial	\$531	\$625	\$813
	Concept 4B Bored Tunnel	\$939	\$1,105	\$1,436
	Concept 4C Hybrid	\$882	\$1,038	\$1,349
ATC to PTC/CONRA C and Civic/Core	Concept 5A Aerial	\$567	\$668	\$868
	Concept 5B Bored Tunnel	\$993	\$1,169	\$1,519
	Concept 5C Hybrid	\$897	\$1,055	\$1,372
Trolley	Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	\$294	\$345	\$449
Enhanced Bus	Concept 7 Bus Concept from SDIA to Old Town Transit Center and City College	\$6.9	\$8.2	\$10.6

Source: WSP, HDR 2022

Notes: ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; SDIA = San Diego International Airport

5.5.4. Operations and Maintenance

Estimation of annual O&M costs for each concept is outside the scope of this study. The evaluation of annual O&M costs for each concept included a high-level comparative assessment of probable O&M costs in qualitative terms.

Table 5-15 presents a qualitative assessment of the main O&M cost elements for the three technologies under consideration – ATC, Trolley (LRT), and bus. Among the various ATC concepts, O&M costs would generally increase as the alignment length, number of stations, and/or ridership increases. Additionally, underground alignments typically have higher O&M costs compared to at-grade or aerial alignments due to ventilation and fire suppression requirements.

Table 5-15. Operations and Maintenance

COST DRIVER	CONCEPTS 3 THROUGH 5 ATC	CONCEPT 6 TROLLEY	CONCEPT 7 BUS
Guideway Infrastructure	<p>\$\$\$</p> <p>The ATC concepts would require maintenance of new guideway infrastructure. Underground ATC segments would require added maintenance of ventilation and fire life safety systems.</p>	<p>\$\$</p> <p>The LRT concept would use existing infrastructure along the Green Line or Blue and Green Line for approximately half of the route. This portion of the route is also at-grade. Therefore, lower maintenance costs would be incurred.</p>	<p>\$</p> <p>Bus infrastructure is shared with infrastructure owned by others and would have low infrastructure maintenance costs.</p>
Operations and Support Staff	<p>\$\$</p> <p>This cost driver reflects cost for personnel (salaries/insurance/medical etc.), and associated support personnel. OMSF design and capacity requirements (restrooms/conference rooms/offices/utility costs) are affected by the number of personnel required for operations. ATC vehicles are assumed to be automated (i.e., driverless).</p>	<p>\$\$\$</p> <p>This cost driver reflects cost for personnel (salaries/insurance/medical etc.), and associated support personnel. OMSF design and capacity requirements (restrooms/conference rooms/offices/utility costs) are affected by the number of personnel required for operations.</p>	<p>\$\$\$</p> <p>This cost driver reflects cost for personnel (salaries/insurance/medical etc.), including drivers/operators and associated support personnel.</p>
Vehicle Maintenance	<p>\$\$</p> <p>ATC vehicles are expected to operate at 4-minute headways requiring high vehicle counts that are complex and costly to maintain.</p>	<p>\$\$\$</p> <p>LRT vehicles are expected to operate on 15-minute headways with vehicles that are complex and costly to maintain. Special maintenance equipment is required for steel wheel truing and rail grinding. LRT vehicles also employ a pantograph system to collect power from an overhead catenary system requiring additional maintenance.</p>	<p>\$</p> <p>Buses would have a high vehicle count with vehicles that are less complex and costly to maintain.</p>

COST DRIVER	CONCEPTS 3 THROUGH 5 ATC	CONCEPT 6 TROLLEY	CONCEPT 7 BUS
Energy Consumption	<p>\$\$\$</p> <p>The performance and frequency of ATC vehicles typically translates to high energy consumption/demand.</p>	<p>\$</p> <p>The performance and frequency of LRT vehicles typically does not translate to high energy consumption/demand.</p>	<p>\$\$\$</p> <p>Energy consumption for buses using internal combustion engines may be low per vehicle, but the number of vehicles required would be high.</p>
Systems	<p>\$</p> <p>A typical ATC uses vehicle location/communication dynamics (as well as Automatic Train Operation) for movement, and authority wayside equipment such as signals/signs and associated cables are minimal.</p>	<p>\$\$</p> <p>Train control systems for LRT would include Automatic Train Protection but not Automatic Train Operation because trains are manually driven.</p>	<p>\$</p> <p>Enhanced bus service typically implements Transit Signal Priority over existing traffic control equipment requiring a nominal amount of maintenance.</p>

Source: WSP and HDR 2022

Notes: ATC = Airport Transit Connector; LRT = light rail transit; OMSF = operations, maintenance, and storage facility

5.6. Community Effects and Economic Benefits

5.6.1. Community Effects and Adjacent Development Considerations

Economic benefits to the region were measured in terms of the potential for redevelopment opportunities and benefits to the surrounding communities served. Community effects evaluates the number of communities and number of jobs that each concept would serve within a 0.5-mile buffer of a station or bus cluster and evaluates the benefits workers and residents would have with enhanced connections under each concept. Vacant properties represent redevelopment opportunities that could drive economic growth. Adjacent development considerations identify the potential for redevelopment opportunities based on the number of vacant properties within a 0.5-mile buffer of a station.

Table 5-16 summarizes the number of communities and/or neighborhoods (per boundaries defined in City of San Diego community plans), population, households, jobs, and vacant parcels of at least 20,000 square feet located within a cumulative 0.5-mile buffer of the stations along each concept. Table 5-17 summarizes the home destination cities for workers employed in the station areas for each concept.

Table 5-16. Community Effects and Adjacent Development Considerations

	CONCEPT	COMMUNITIES SERVED	POPULATION	HOUSEHOLDS	NUMBER OF JOBS ¹	VACANT PARCELS	SQ. FT
ATC to PTC/CONRAC and Santa Fe Depot	Concept 3A Aerial	8	19,500	9,900	49,000	0	0
	Concept 3B Bored Tunnel	8	20,100	10,300	50,200	0	0
	Concept 3C Hybrid	8	19,500	9,900	49,000	0	0
ATC to PTC/CONRAC and Convention Center	Concept 4A Aerial	10	26,500	14,700	65,700	0	0
	Concept 4B Bored Tunnel	10	27,100	15,100	66,800	0	0
	Concept 4C Hybrid	10	26,500	14,700	65,700	0	0
ATC to PTC/CONRAC and Civic/Core	Concept 5A Aerial	10	29,000	16,100	72,400	0	0
	Concept 5B Bored Tunnel	10	29,500	16,400	72,400	0	0
	Concept 5C Hybrid	10	29,000	16,100	72,400	0	0
Trolley	Concept 6 Trolley from SDIA to 12th & Imperial Transit Center	7	28,500	15,600	70,000	0	0
Enhanced Bus	Concept 7 Bus Concept from SDIA to Old Town Transit Center and City College	9	36,600	20,400	88,300	1	50,000

Source: WSP, HDR, TAHA 2022

Notes:

¹The OntheMap tool displays employment data at the census place and census block levels. OntheMap does not differentiate between employment headquarters that are physically located within the same census block.

ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; SDIA = San Diego International Airport

Table 5-17. Home Destinations for Workers in Each Concept Project Area

CITY	SHARE OF TOTAL JOBS (%) BY STATION AREA ¹²				
	CONCEPT 3: ATC TO PTC/CONRAC AND SANTA FE DEPOT	CONCEPT 4: ATC TO PTC/CONRAC AND CONVENTION CENTER	CONCEPT 5: ATC TO PTC/CONRAC AND CIVIC/CORE	CONCEPT 6 TROLLEY FROM SDIA TO 12TH & IMPERIAL TRANSIT CENTER	CONCEPT 7 BUS CONCEPT FROM SDIA TO OLD TOWN TRANSIT CENTER AND CITY COLLEGE ³
San Diego	49.3	49.4	49.4	49.2	49.4
Chula Vista	8.5	8.7	8.2	8.9	8.3
El Cajon	2.3	2.2	2.2	2.2	2.2
Los Angeles	2.0	2.2	2.2	2.2	2.2
National City	2.1	2.3	2.0	2.3	2.1
La Mesa	2.1	2.1	2.1	2.1	2.1
Santee	1.6	1.4	1.4	1.5	1.4
La Presa	1.2	1.2	1.1	1.2	1.1
Lemon Grove	1.1	1.1	1.0	1.1	1.0
Carlsbad	0.0	1.0	1.0	0.0	1.0
Spring Valley	0.0	0.0	0.0	1.0	0.0
Escondido	1.0	0.0	0.0	0.0	0.0
Imperial Beach	0.0	0.0	0.0	0.0	0.0
All Other Locations ⁴	28.9	28.4	29.4	28.4	29.0

Source: US Census Bureau 2022

Notes:

¹Station Areas are defined as a 0.5 mile buffer from each station centroid.

²The OntheMap tool commute destination information does not differentiate between worker transport mode (if any), regular or occasional commutes, or whether an employee works remotely. Workplace destinations are defined by the physical mailing address of each employment headquarters.

³A bus station cluster area is an area within 0.5 mile from a given grouping of stations grouped based on geographic proximity.

⁴Includes all other US Census defined Places from where workers commute.

ATC = Airport Transit Connector; CONRAC = Consolidated Rental Car Center; PTC = Port Transit Center; SDIA = San Diego International Airport

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6. STAKEHOLDER COORDINATION

Throughout the course of this study, the San Diego Association of Governments (SANDAG) coordinated with the following stakeholders: California Department of Transportation, City of San Diego, Metropolitan Transit System (MTS), North County Transit District (NCTD), Port of San Diego (Port), and San Diego County Regional Airport Authority (Airport Authority). The goal of the meetings was to receive input on the concepts and criteria and keep stakeholders up to date on the status of the study. Reoccurring meetings were held with the stakeholder agencies, both in a group setting during which general updates were provided, and in one-and-one meetings to discuss specific items in more detail. The group meetings focused on the content of the study, including definition of concepts, evaluation criteria, and schedule. More detail was provided as the study progressed. One-on-one meetings focused on specific coordination items with a specific agency, including site layouts, concept alignment options, and intermodal coordination.

Some of the specific coordination efforts included:

- Meetings and coordination with SANDAG and MTS to collaboratively develop the description of Concept 6 (Trolley). Coordination also occurred regarding the criteria used in the analysis.
- On September 8, 2022, a community meeting was held for the broader Central Mobility Hub (CMH) Project, combined with the CMH Comprehensive Multimodal Corridor Plan.
- On September 9, 2022, SANDAG met with representatives of the Port. Port staff provided updates related to existing conditions and near term or planned uses on Port property and discussed environmental conditions. SANDAG staff presented proposed concepts for the Port Transit Center and updates on possible designs if that concept were to move forward. The project team presented design exhibits for the ATC alignment shifted to the north side of Harbor Drive from the middle of Harbor Drive. Port staff were supportive of the alignment shift. Exhibits also included the optional Harbor Drive Station with pedestrian bridge and the south route alignment spurring from the north route to serve Santa Fe Depot and the Civic Center.
- On September 14, 2022, SANDAG met with representatives of the Airport Authority to provide an update on the study and discuss the proposed concepts. The SANDAG team noted that the USFWS and CDFW did not state a preference for the configuration of the ATC alignment in proximity to the least tern nesting area. Attendees discussed the alignment and station location near the Consolidated Rental Car Center and at San Diego International Airport. Airport Authority staff suggested shifting the station platform at the Consolidated Rental Car Center farther north. SANDAG staff also presented the revised alignment design shifted to the north side of Harbor Drive.
- On September 27, 2022 and April 17, 2023, SANDAG met with representatives of the Airport Authority to provide an overview of the travel demand forecast modeling work completed for the study.

- Updates were also provided to the SANDAG Board of Directors at the July 22, 2022, meeting.

A CMH Comprehensive Multimodal Corridor Plan meeting was held on August 10, 2022, during which NCTD stated its desire to discuss the effect that a Los Angeles–San Diego–San Luis Obispo Rail Corridor platform at the Port Transit Center could have on operations if that concept element moves forward. Also, during this meeting, the Airport and the City expressed the need to talk further if the concept that closes West Palm Street moves forward.

7. FUTURE STEPS

Through this study, the San Diego Association of Governments (SANDAG) staff have completed a comprehensive analysis of concepts for improved transit connectivity to San Diego International Airport. The concepts evaluated may be further refined, either in the coming months and/or during the environmental clearance process. The concepts do not preclude a Central Mobility Hub or roadway and active transportation projects proposed along Laurel Street, Harbor Drive, and Pacific Highway. As is typical for this type and scale of public investment, the next step is to initiate the environmental process so preliminary engineering, environmental analysis, community outreach, and stakeholder coordination can progress to refine the scope, cost, and risks and benefits of the concepts selected as the proposed project and alternatives in the environmental process.

SANDAG staff recommend the following steps:

- Continue coordination with key stakeholders before the initiation of the formal federal and state environmental clearance process and throughout the design process. Stakeholder coordination will help inform which Airport Transit Connector alignments and termini move forward, as well as whether design options, including two optional stations, the direct access ramp connecting Interstate 5 directly to a drop-off location at the Port Transit Center, and the Los Angeles–San Diego–San Luis Obispo Rail Corridor side platform for Amtrak Surfliner and COASTER trains should advance into the environmental clearance process.
- Prepare and release the Notice of Preparation to initiate the formal CEQA environmental process, for which SANDAG will act as lead agency, following direction from the SANDAG Board on the concepts to advance to the environmental process. A federal lead agency for purposes of National Environmental Policy Act review would be identified in the event that the concepts carried forward for study require federal approvals.
- Advance the design of the concepts that are carried into the environmental process as additional information such as, but not limited to, geotechnical information, seismic fault information, key utility conflicts, and other planned projects is obtained.

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