# Sacramento Valley Station *Area Plan*

Public Draft, August 26, 2020

## *Technical Appendix A*
# *Program*


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City of SACRAMENTO Perkins&Will

***Administrative Draft*** *August 2020*

## Memorandum

ARUP

| | | | |
|---|---|---|---|
| To | Geeti Silwal | Date | May 9, 2019 |
| Copies | Rich Coffin, Anthony Bruzzone, Dennis Dornan | Reference number | 252563 |
| From | Mathew Bamm | File reference | 04 |
| Subject | SVS: Updated Baseline Planning/Capacity Information | | |

**Purpose**

The purpose of this memorandum is to:

- Establish SVS baseline design and current usage
- Identify future use aspirations and capacity estimates
- Identify baseline planning and engineering criteria at the station and on the approaches, and
- Consider implications of these capacities and criteria on station design.

**Current Station Design, Operations and Use**

Reference is made to the January 24, 2017 Arup memo *SVS: Updated Baseline Planning/Capacity Information*, which began the process for an analysis of the rail and off-street bus operational capacity and demand of the SVS complex. This memorandum updates that initial memo and provides new analysis in the context of revised plans that are in the 2018 State Rail Plan, as well as operational plans from Capitol Corridor and the San Joaquin Joint Powers Authority (including the San Joaquin trains and the ACE trains).

The SVS operational areas (those areas where revenue vehicles operate) consists of trackway, platform, bus transfer and landside access (i.e., the roadway area in front of the station).

*Operational Trackway and Approaches*

Trains approach from the west across the I Street Bridge (crossing the Sacramento River), a two-level steel truss swing bridge built in 1911. The bridge carries two tracks on the lower level, which then approach at essentially level grade into the station platform area. After landing on the east bank, tracks skew slightly to the northeast and fan out to the platform area. The following summarizes the operational terminal area:



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- Four dedicated passenger tracks serve two platforms
- Two freight tracks – outboard of the passenger tracks on both sides.
- Freight tracks – separated from the passenger tracks by 25 feet (centerline distance) and by another 25 feet to the south side of the operational area and about 40 feet to the north side of the operational area.
- Service road – a service road is provided between the platforms and adjacent to the southern track on the westbound platform and the northern track on the eastbound platform. This roadway area is about 22 feet wide between the tracks (measured from the edge of ballast).
- Passenger Platforms – about 25 feet wide by about 1,050 feet long (tangent). The curved areas of the platform extend about 200 to 300 feet beyond the tangent section.
- Total railroad operational area is about 1,300 feet by about 215 feet.

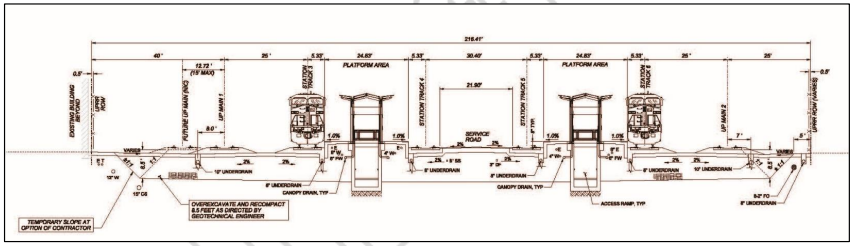


Figure 1- Cross-Section SVS Platforms

Immediately adjacent to the north of the station building, an intercity bus facility (about 200 feet long by 50 feet wide) provides terminal facilities for eight large "highway" buses which connect with state-sponsored trains. Also along the north side of the station building is a 150-foot-long taxi staging area, and the turnback/terminal for the Sacramento RT Gold Line (about 800 feet long). Sharing the LRT platform is a 300 foot long area for three urban bus stops.

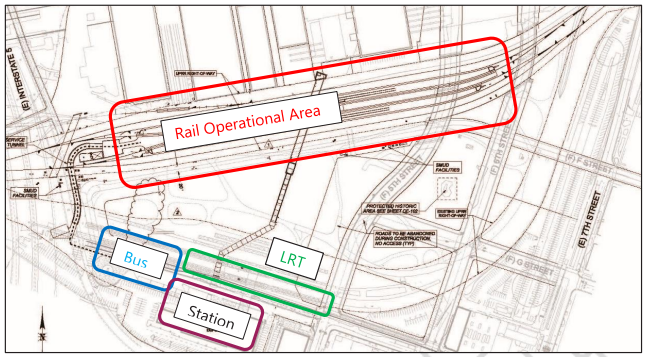


Figure 2 - Plan View, SVS

At the southern entrance to the station building, a 200-foot-long drop-off curb provides access, and between the station and I Street, a surface parking lot can accommodate about 80 automobiles. Assorted other automobile parking is available on the perimeter of the station, but not necessarily devoted to station uses.

*Current Transportation Tenant Use*

The SVS hosts one tenant (Amtrak), and indirectly, the contract operations funded and organized through the Capitol Corridor JPA, the buses that Caltrans sponsors on behalf of the state-sponsored Amtrak services and Solano Express.

Train use – Capitol Corridor operates 15 trains in each direction daily between Sacramento and the Bay Area, with the one daily train also operating to/from Auburn/Roseville. The closest-spaced trains arrive within 25 minutes of each other. Trains operate in push-pull operation, reversing directions, usually on the platform, at SVS. Current train consists are up to five cars, totaling about 480 feet, and carrying up to 400 passengers per train.

The state-sponsored San Joaquin operates two trains in each direction daily to/from Bakersfield, with the same railcars and approximate consist make-up as the Capitol Corridor. These trains originate/terminate at SVS.

In addition, Amtrak operates the California Zephyr daily (each direction) and the Coast Starlight daily (each direction). These trains can be as long as 1,000 feet.







Train Summary (each direction):

- Capitol Corridor 15
- San Joaquin 2
- Other Amtrak 2
- Total 19

Bus use – In addition to train movements, a significant number of highway-type intercity buses operate into SVS as timed connections to the rail services. Both Capitol Corridor and the San Joaquins have dedicated connecting bus trips, as follows:

Dedicated Intercity-Train Bus Trips (each directions):

- All Day: 24
- Highest Hour: 7

Greyhound, Megabus and Flixbus operate additional intercity bus services from locations remote from SVS. Greyhound operates from a terminal on Richards Boulevard about half-mile from SVS. Megabus services Sacramento at University/65$^{th}$ LRT Station, about five miles from SVS. FlixBus is a new carrier and operates from the University/65$^{th}$ LRT station, as well as a stop in midtown and under U.S. 50 in downtown Sacramento. The totals for these other operators are as follows:

Off-Site Intercity Bus Trips (each directions):

- All Day: 34
- Highest Hour: 8

Charter buses and corporate shuttles are not included in the intercity bus total, but represent another potential user of SVS bus facilities, especially for midday and off-peak uses when bus platform capacity may be available.

Regional Buses – Of the regional buses (i.e., those buses from outside the Sacramento city limits) only Solano Express currently operates into SVS. However, additional regional routes could (in the future) serve multiple functions as feeders into the rail network and their use of SVS could create benefits for operators, passengers and for the functioning of the overall statewide rail network. Accordingly, an assessment includes these trips serving SVS-adjacent locations in downtown Sacramento:

Regional Bus Trips (each direction):

- All Day: 201
- Highest Hour: 78

It should be noted that service levels have increased substantially in the last three years – the peak hour has seen a 40% increases in bus trips. Not all regional buses may be appropriate for use of SVS – some buses (i.e., from Davis and West Sacramento) are relatively short, urban-transit type trips. Further analysis and discussion is suggested to determine the best candidates for SVS use.



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Urban Buses – Sacramento RT will change its service in September, and operate two high frequency (service every 15 minutes) routes into SVS: Route 30/38 and Route 51 (both terminate at SVS):

- Route 30/38: 15-minute frequencies
- Route 51: 15-minute frequencies

Route 30/38 services Sacramento State University and the 65th/University LRT station. Route 51 links SVS and downtown to the Stockton Boulevard corridor.

Light Rail Service – Sacramento RT operates the Gold Line connecting SVS with Rancho Cordova and Folsom. The Gold Line terminates at SVS. The Green Line, which will eventually serve all the Railyards area and continue north on Truxel Road, terminating at the airport, provides service on 7th Street. LRT service generally operates every 15 minutes, four cars trains can operate in the peak, resulting in a capacity of about 500 passengers per train.

**Potential Future Transportation Services**

The California State Transportation Agency's (CalSTA) *2018 California State Rail Plan* guides statewide intercity rail development. CalSTA developed the plan in collaboration with the High Speed Rail Authority, Capitol Corridor JPA, the San Joaquin Joint Powers Authority and the San Joaquin Regional Rail Commission, along with southern California stakeholders. The State Rail Plan embraces a connection-focused system (similar to those operated by progressive national/state rail systems in Europe, with timed pulse connections) and combines the service aspirations of the rail stakeholders.

*Current and Future Demographics*

The State Rail Plan responds to significant population and economic growth forecasts for California. In the Sacramento region, the Sacramento Council of Governments (SACOG) develops detailed regional forecasts. SACOG will issue detailed updated growth forecasts in February 2020. Aggregate regionwide growth levels are available, and in the overall SACOG region by 2040, population is expected to increase to about 3.1 million (about 630,000 more residents) and employment to about 1.35 million (about 260,000 more jobs) – both representing about 1% annual growth.

The State Rail Plan identifies high growth in intercity travel between the Bay Area and Sacramento (more than 70% increase to about 73 million annual two-way trips) and about 23 million annual trips between the San Joaquin Valley and Sacramento (also exceeding a 70% increase). Just with these two markets, the total number of increased annual intercity trips into the Sacramento region exceeds 40 million, or more than 100,000 trips daily.

*Rail Operator Aspirations*

For the purposes of this planning effort, 2027 service plans as identified in the State Rail Plan are the target year consideration, with provisions for additional service increases identified. The table below identifies the expected service levels for 2027:



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**2027 Service Levels**

| Service | Daily Trains (each direction) | Trains/Hour (each direction) | Train Capacity | Hourly Capacity (each direction) |
|---|---|---|---|---|
| Capitol Corridor | 20 | 2 | 500 | 1,000 |
| San Joaquin | 11 | 1 | 500 | 500 |
| ACE | 1 | 1 | 500 | 500 |
| Amtrak (other) | 2 | 1 | N/A | N/A |
| TOTAL | 34 | 5 | | 2,000 |

The Roseville Third-Track project is currently in design, and the project is managed by Capitol Corridor. In 2027, this third track between Sacramento and Roseville is assumed, along with a tail track east of SVS, resulting in all Capitol Corridor trains "running-through" the station and reversing directions either at the tail track, or in Roseville (or in Colfax).

San Joaquin service is expected to increase, with access via the UPRR Sacramento Subdivision (using the midtown tracks between 19th and 20th Streets). The current plans are for these trains to bypass SVS and instead operate on the Sacramento Subdivision to Natomas and Marysville, resulting is about one-third of Sacramento-bound 2027 intercity/commuter rail service not using SVS. The table below interprets State Rail Plan service levels into Sacramento for 2040:

**2040 Service Levels**

| Service | Daily Trains (each direction) | Trains/Hour (each direction) | Train Capacity | Hourly Capacity (each direction) |
|---|---|---|---|---|
| Capitol Corridor | 32 | 2 | 500 | 1,000 |
| High Speed | 16 | 1 | 1,000 | 1,000 |
| San Joaquin | 23 | 2 | 500 | 1,000 |
| ACE | 1 | 1 | 500 | 500 |
| Amtrak (other) | 2 | 1 | N/A | |
| TOTAL | 74 | 7 | | 3,500 |

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In 2040, Capitol Corridor service doubles, and trains operate every 30 minutes from Sacramento to the Bay Area. This service increase is catalyzed by the delivery of a new San Francisco Bay crossing that includes a conventional rail track to allow direct service between San Francisco and the State Capital.

High Speed rail service is assumed to provide direct service to Fresno and eventually Los Angeles. Regional service operates from Fresno to the north (hourly), with additional peak period service between Merced and Sacramento.

The current default train capacity for Capitol Corridor, San Joaquins and ACE is based on six-car trains with 80 passengers per car – rounded to 500 passengers per train. It is possible to increase the consist size to eight cars, increasing capacity to about 650 per train.

Based on stakeholder and operator comments gleaned from team meetings and conference calls, the design assumption is that by 2040 all trains "run-through" and do not terminate on the SVS platforms. As an example, Capitol Corridor trains would operate from the Bay Area, serve SVS, and then continue to Roseville. San Joaquin trains would continue from Stockton and under options to serve SVS continue to either Davis or perhaps terminate at a future West Sacramento turnback.

Note that while train capacity is estimated at up to 3,500 (or approaching 4,600 per hour with longer trains), in practice demand at SVS will be lower, as passengers board and alight at multiple stops along the routes. This memo assumes that maximum SVS demand is will not exceed about 50% of the overall capacity – although during special events (basketball games, concerts, etc.) full trains may leave the station. In any case, additional modeling will be required to validate this working assumption.

**Baseline Planning and Engineering Criteria**

Based on the stakeholder suggested future operating plans, the current platform design is adequate for all contemplated future Capitol Corridor, San Joaquin and ACE operations.

*Station Operations*

Assuming the most aggressive service increase (in 2040), about 7-10 trains per hour in each direction would serve SVS. Each platform face will be assigned half of this service, or about 3-5 trains per hour per direction. That will result in a train on each platform face every 12 to 15 minutes. If, however, trains terminate at the platform instead of "running-through," this level of throughput will not be realized.

The existing platforms have adequate length for the identified consists. However, subject to demand levels, the platform width may not be adequate (typical new platforms are about 30 feet). As a result, further analysis is suggested, but this is likely not a fatal flaw.

*Service Reliability*

Capitol Corridor has identified the existing nearly-110-year old I Street Bridge as a potential reliability and capacity constraint. While 2040 service levels may not result in impacts on river traffic (it is likely that river traffic will still have reasonable opportunities to transit the river under the bridge during gaps in rail service), the need to operate SVS as a run-through station suggests that a new three-track bridge be explored.



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However, for service levels assumed in 2027, and assuming that Capitol Corridor operates through-service on Tracks 3 and 4 (using the new third track to Roseville), the service increase from the San Joaquin Valley trains can be accommodated on platforms 5 and 6 and trains can terminate on that platform without excessive conflict. A theoretical schedule has been developed that assumes 30 minute platform dwells and also provides minimums of 15 minute separation between train arrival and departure.

A key limiting factor of this approach, however, is connecting infrastructure and institutional arrangements. There is currently no track connection between the Sacramento Subdivision and SVS, although a link has been studied at a conceptual level. In addition, the operating agreement between UPRR and the State would need to be amended to allow additional service on the UPRR route into SVS, potentially including additional infrastructure on the one-mile segment between SVS and the Sacramento Subdivision. It should also be noted that the Sacramento Subdivision is a single track, at-grade line that operates through Midtown Sacramento, effectively limiting overall capacity from the San Joaquin Valley – service levels assumed for 2040 will require significant upstream rail improvements.

*Connecting Intercity Bus Services*

At the hour (5:00pm-6:00pm) of highest number of trips, Amtrak schedules seven buses that pulse with train connections. In addition, in the same hour the other intercity operators schedule four additional movements (the total is 11, of which seven are arrivals and four are departures). As trains replace buses in the future, the number of Amtrak buses may drop. Conversely, intercity bus trips may increase. Another growth factor is the addition of regional bus services. Further analysis and discussion is required for the development of an overall bus program, but the range of departures could be from 25 to 40 per hour, or about 15 in the peak 15 minutes. At any one time, the regional bus service could require 10 bus berths.

The total program for bus berths is forecast as follows:

| | |
|---|---|
| Regional Buses: | 10 |
| Intercity/Amtrak (departure): | 5 |
| Intercity/Amtrak (arrival): | 5 |
| TOTAL: | 20 |

The State Rail Plan recommends increases in intercity/Amtrak bus service to provide good connections to almost all trains using SVS. However, most of these service increases are outside of the 5:00pm-6:00pm existing peak hour, and likely do not result in the need for additional bus infrastructure beyond the 20 berths identified. There could also be some consolidation of services, as CalSTA is exploring using regional services as assigned Amtrak feeders, increasing the efficiency of the entire network and reducing duplication.

The bus program can be accommodated with a "sawtooth" curb configuration – with buses circulating around a central passenger boarding island and buses operating in independent one-direction movement

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– with a curb length of about 1,200 feet (on a 600-foot double sided platform). Alternatively, these same 20 berths can be provided at a 45-degree angle – drive in, back out – single sided design in a curb length of about 500 feet. The 45-degree parking requires a wider drive aisle and is also less efficient operationally than the sawtooth design.

*Landside Connections*

In addition to the rail and bus facilities connected to the interior of the SVS, there are exterior access modes serving SVS. A "sketch" assessment of these additional activities on the exterior of the station include:

- Light Rail – Sacramento RT's Gold Line already operates into the SVS, with four-car platforms and tail tracks. Both SVS Options 1 and 2 realign the light rail system to work more efficiently with the future SVS design.
- Streetcar – Sacramento and West Sacramento are collaborating on a new streetcar system that will link both cities. It is anticipated that the streetcar will be routed via the existing LRT trackage along H Street, at about the midway point of the route.
- Urban Bus – At least two bus berths in each direction will be provided for at the station, likely on city streets.
- Taxi/TNC – Hail services – either traditional taxis or CPUC-licensed TNCs – will be provided with a holding lot and dedicated curb area. Based on 1,300 passengers (2040) in the peak 15 minutes[1] with 20% using cabs/TNCs, and assuming 1.5 passengers per vehicle, about 150 TNC/cabs would be needed in a 15-minute period, and about 50 in a five-minute window. This requires a holding lot for about 50 vehicles and a curb length of about 300 feet for pick-up.
- Parking – Automobile parking is currently provided at SVS, however in the future, most train services will operate as "run-through." It will be easier, less expensive and more consistent with good urban design and land use priorities to eliminate parking at SVS in favor of providing parking on the train service branches and instead incorporating good pedestrian, cycling, bus and taxi/TNC facilities at SVS.

  Parking, while not the highest use at SVS, is still available at adjacent lots and facilities within walking distance of SVS.

  However, a passenger drop zone of about 200 feet will be required for good access.

[1] The Taxi/TNC formula is as follows: 4,000/pax hour x 33% = 1,300 in the peak 15 minutes. 1,300 x .20% (taxi/TNC)= 175 taxi/TNC vehicles in the peak 15 minutes.

*[Intentionally left blank]*

# ii. Station Program areas (GA)

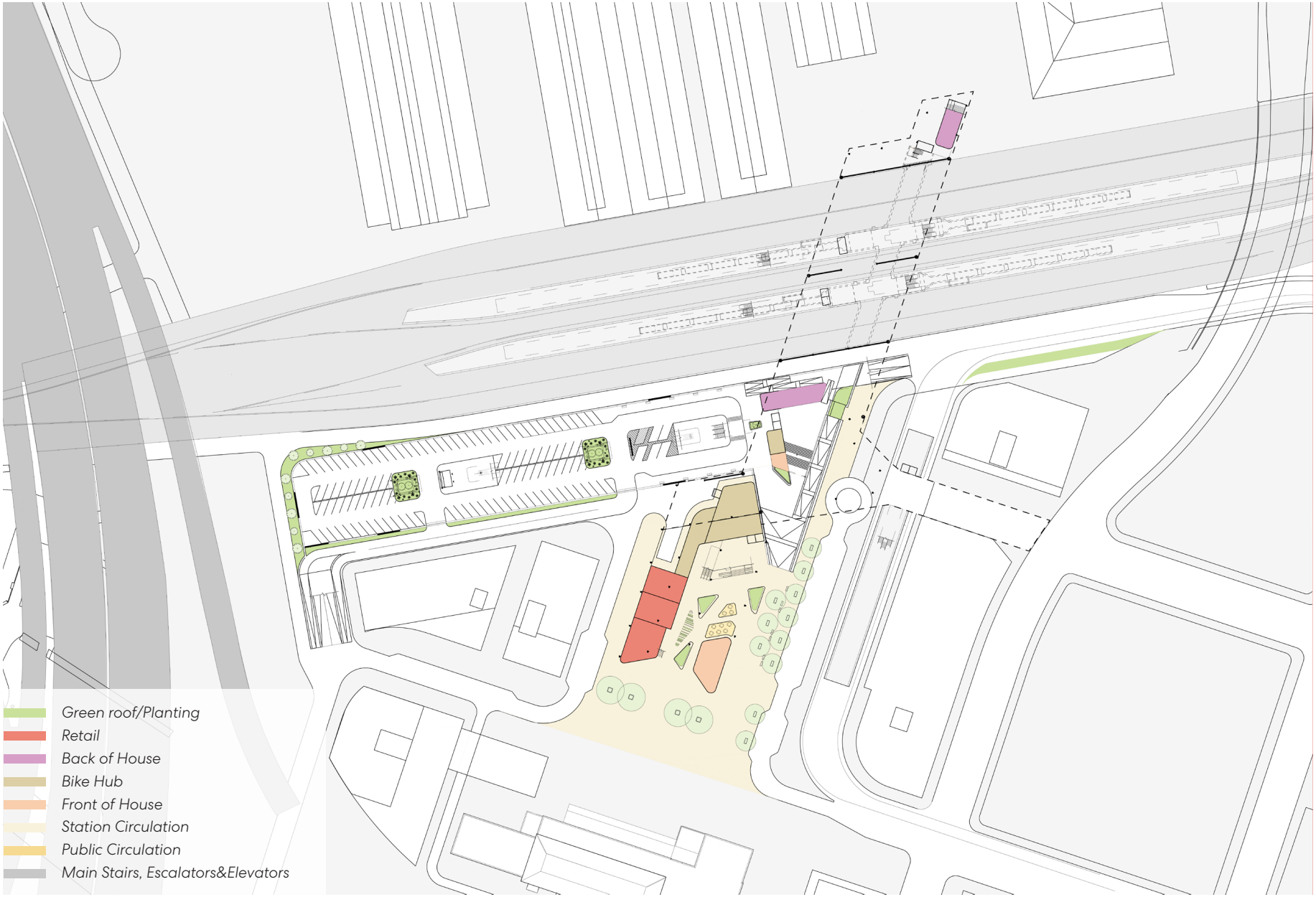
Public Draft, August 26, 2020

| PROGRAM AREA | | Bus Facilities | Station Concourse |
|---|---|---|---|
| FOH | | | |
| TICKETING | Cash and Recon | 500 | 2000 |
| | Ticketing Sales | | |
| | Customer Service/Information | | |
| | Baggage and Handling * | | |
| | Passenger Processing -security check + fare gates* | | |
| | Restrooms | 600 | 2,000 |
| | **SUBTOTAL** | **1,100** | **4,000** |
| TICKETED CONCOURSE | | | |
| | Waiting area | 15000 | 40,000 |
| | **SUBTOTAL** | **15,000** | **40,000** |
| RETAIL | | | |
| | Retail in plaza | 0 | 13000 |
| | Retail on concourse | 0 | 5000 |
| | **SUBTOTAL** | **0** | **18,000** |
| BOH SUPPORT | | | |
| SYSTEMS | Mechanical rooms* | 1700 | 11,000 |
| | Electrical rooms* | | |
| | Station Communication rooms and UPS | | |
| | FACP + Fire Pump | | |
| | Main Signal room | | |
| | Core system comm. Room | | |
| | Reclaimed water storage | | |
| | Circulation | | |
| | Electrical Yard | | |
| STAFF | Offices, Conference Rooms, Training/briefing, Break Room* | 1300 | 13,000 |
| | Security Office* | | |
| | Restrooms | | |
| | Break rooms | | |
| | Storage: Lost and Found* | | |
| | Storage: Attic stock, machinery and vehicles* | | |
| | Storage: Janitorial | | |
| | Loading, receiving, supply | | |
| | Trash | | |
| | BOH Circulation | | |

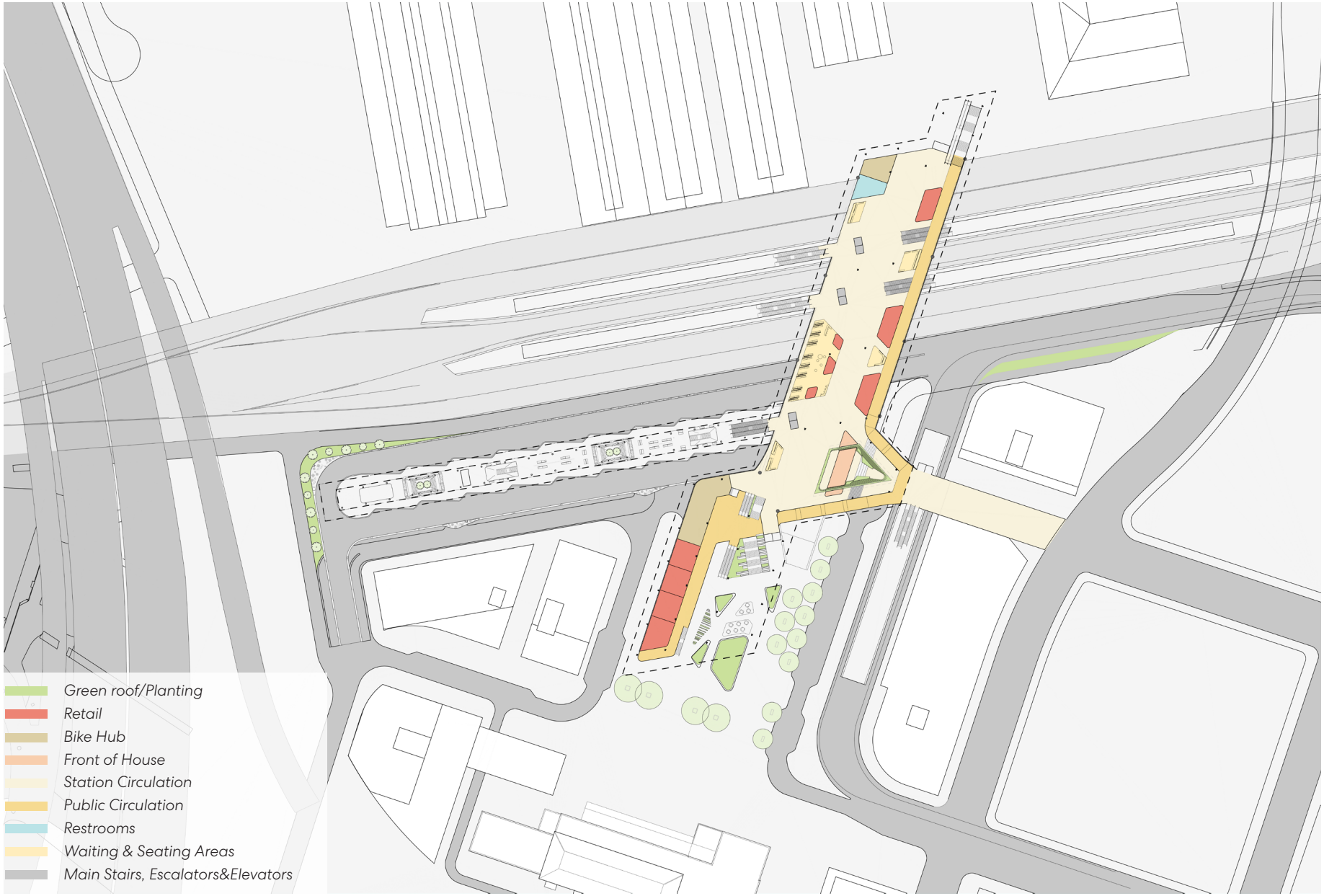
| | | | |
|---|---|---|---|
| | **SUBTOTAL** | **3,000** | **24,000** |
| **TRANSIT** | | | |
| BIKE | Bike parking_storage | 2500 | 2,500 |
| | Bike retail and repair | 500 | 500 |
| | Bike lockers, restroom, showers | 200 | 200 |
| | Bike Path | 8,100 | 8,100 |
| BUS | Bus Operators Breakroom | 500 | 500 |
| | Bus Operators' Restrooms | 200 | 200 |
| | Bus Plaza | 44,300 | 44,300 |
| | Busways | 50,000 | 50,000 |
| LRT | LRT | | 14,000 |
| RAIL | Rail Platforms | | |
| CAR | Private Vehicle Drop Off* | | |
| | Parking | | 50,000 |
| | **SUBTOTAL** | **106,300** | **170,300** |
| | **TOTAL** | **125,400** | **256,300** |

# iii. Enlarged Station and BMC plans (GA)

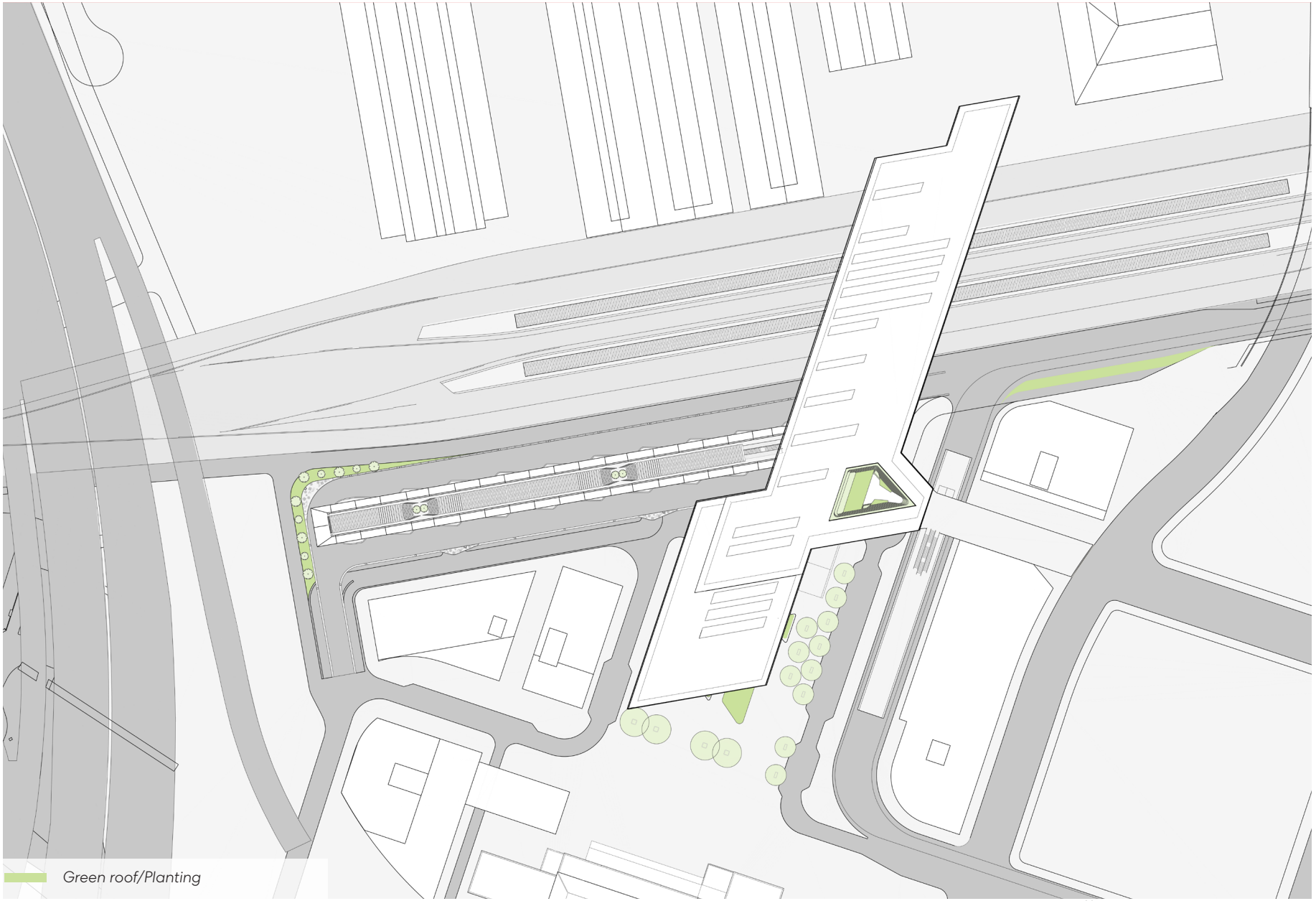




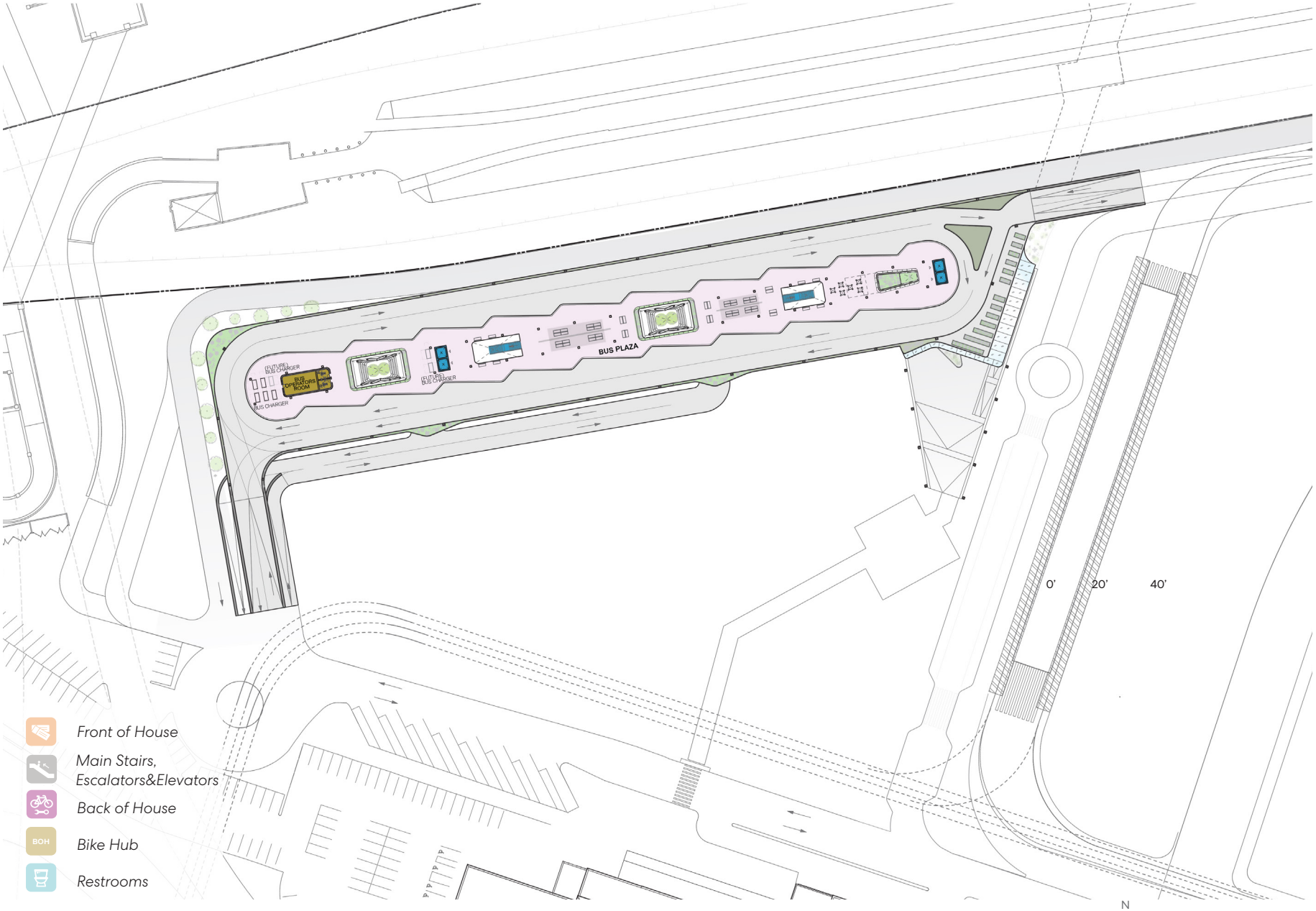

*Station Plan - Ground Floor*



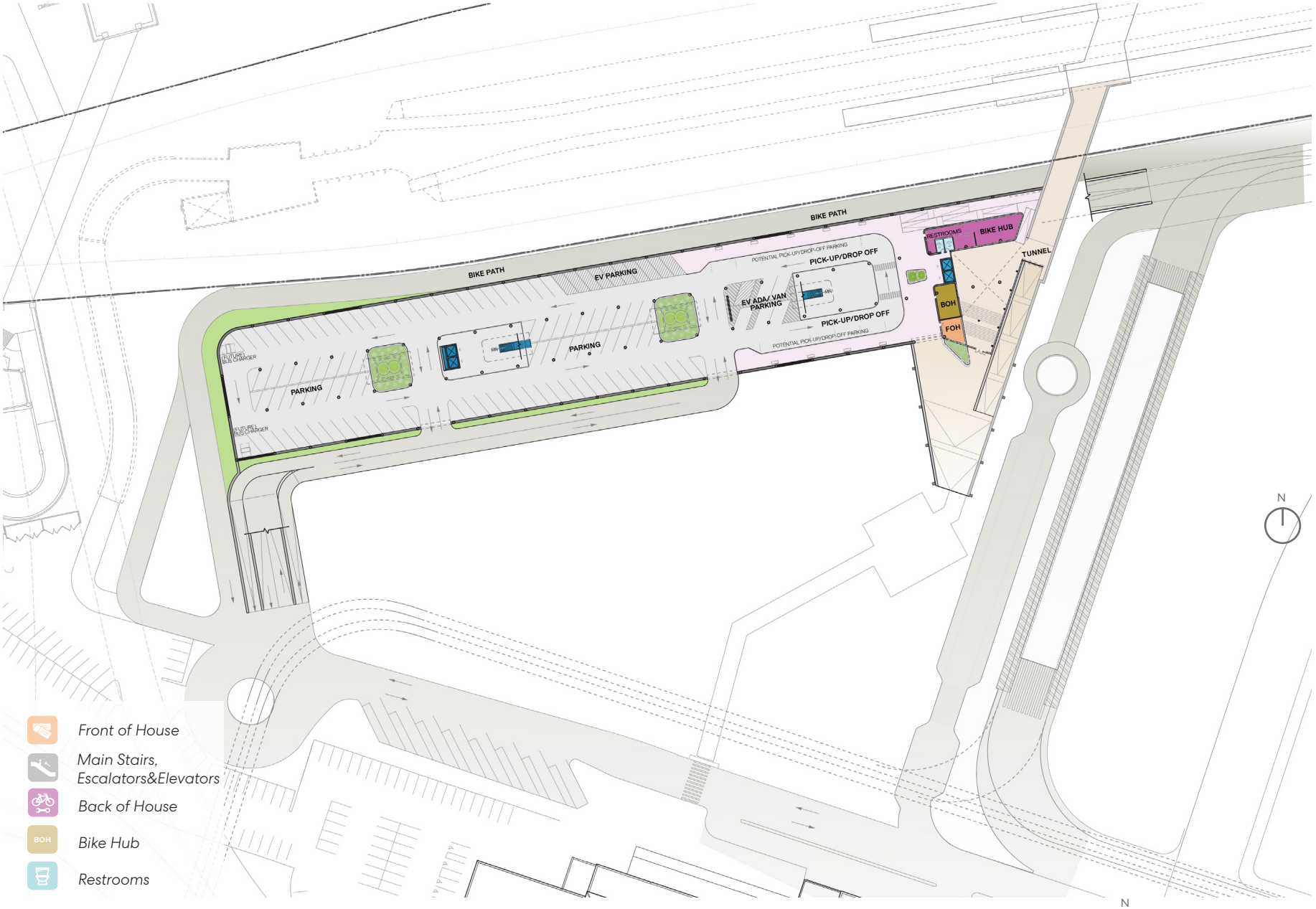

*Station Plan - Concourse Level*



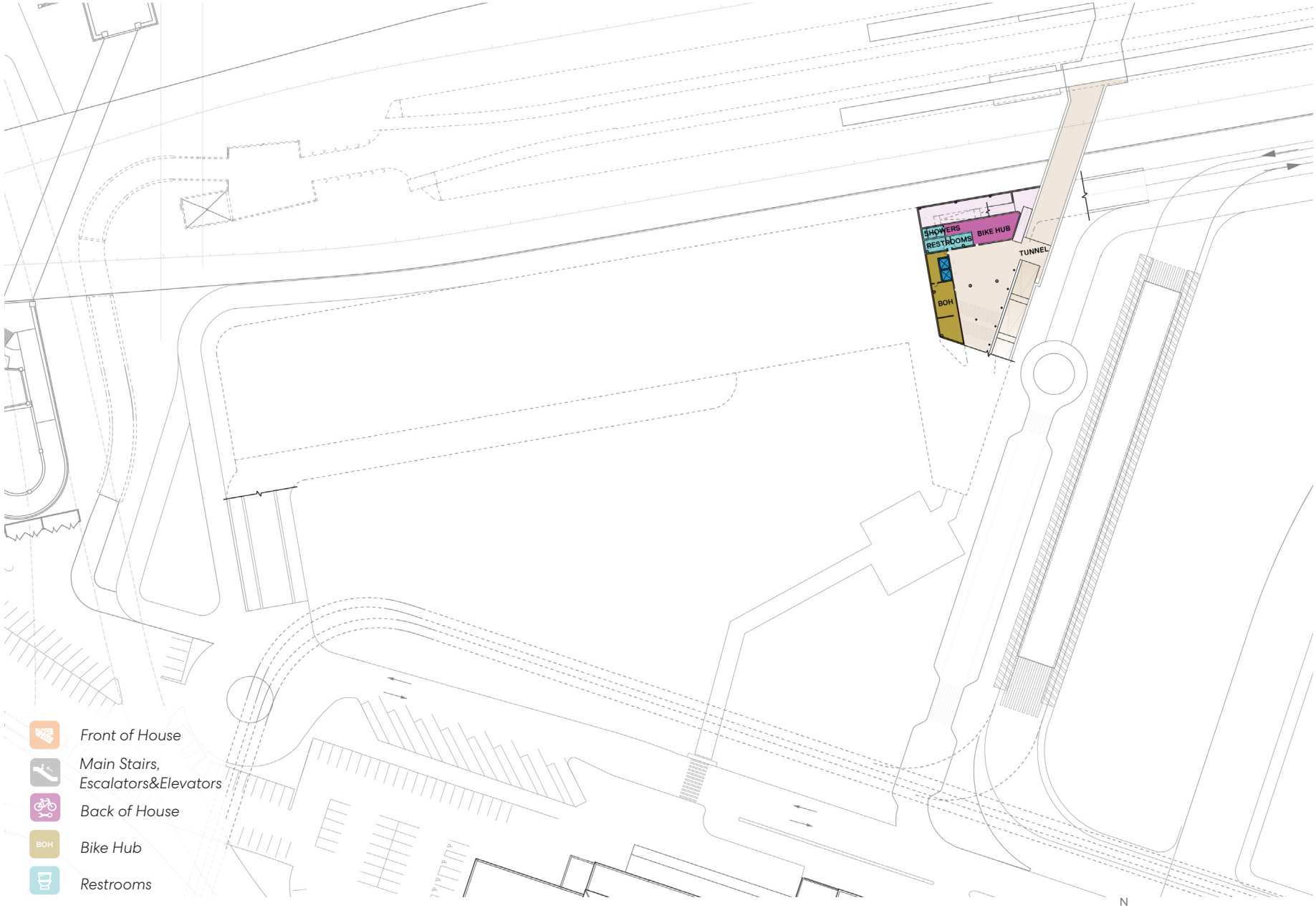

*Station Plan - Roof Level*




*Bus Mobility Center - Plan - Parking Level*




*Bus Mobility Center Floor Plan - Bus Plaza Level*




*Bus Mobility Center Floor Plan - Tunnel Level*