

Transit Needs Study for the Wilmington Multi-Modal Transportation Center

Final Report
May 2009



**MARTIN
ALEXIOU
BRYSON**

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Transit Needs Study for the Wilmington Multi-Modal Transportation Center

Final Report, May 2009

Executive Summary

Purpose and Background

This study represents the latest stage in the development of the Wilmington Multi-Modal Transportation Center (WMTC).

The WMTC will be located between North 3rd Street and North 4th Street, and between Red Cross Street and Hanover Street, on the northern edge of downtown (see study area map on next page). It will bring together local bus service (Wave Transit), inter-city bus service (Greyhound), the downtown trolley, human-service transportation and taxis. It will also be the downtown station for future passenger trains. The WMTC will not only provide improved facilities and convenience for transit riders, but will also represent an investment in downtown Wilmington and its economic development.



The center aims to support not only citizens' travel needs but also the downtown economy

Previous studies had identified the operational and space requirements of some of the transportation services, but these were five years ago or more, and some of that information may now be out of date. In addition, previous studies had concentrated on selecting from a range of possible locations. With that goal accomplished, it is now time to plan the site's functional layout and specific land requirements in more detail.

The North Carolina Department of Transportation (NCDOT), which is leading the process for developing the WMTC, therefore commissioned this study to update the operational and space requirements of the transportation services expected to use the WMTC, and to prepare a functional site plan. The City of Wilmington also participated in funding the study.



Winston-Salem Transportation Center

The study looked at not only today's needs and current plans, but also potential growth in services over the lifetime of the WMTC. This in turn would enable decisions to be made on whether additional land needs be purchased.



Wilmington Multi-Modal Transportation Center Study Area

Study Process

This study was coordinated by a Steering Committee, which included representatives of NCDOT Rail Division, NCDOT Public Transportation Division, Cape Fear Public Transportation Authority (Wave Transit), and transportation planning staff from the City of Wilmington / Wilmington Metropolitan Planning Organization (WMPO). The study was completed by a consulting team from Martin/Alexiou/Bryson (M/A/B) and Moffatt & Nichol, working with the Steering Committee, other transportation providers, and stakeholders.

The study process included:

- Reviewing background information, including previous studies for the WMTC, other transportation and land-use plans, and other community plans and projects (described in **Section 2** of this report).
- Estimating the potential for future growth in local transit service (**Section 3**).
- Contacting stakeholders (including potential transportation providers and other downtown stakeholders) to understand their views and aspirations for the WMTC and the northern downtown area (**Section 4**).
- Using this information to update the functional requirements and space needs for the WMTC (**Section 5**).
- Assessing the site characteristics and how they might affect the design options and choices (**Section 6**).
- Developing a range of possible site layouts, developing a shortlist of the most viable options, and deciding on the recommended option (**Section 7**).

Transportation Needs

The study confirmed that construction of the WMTC remains an important goal for the city and for transportation providers. Wilmington and the surrounding urban area are growing, and have adopted increasingly transit-friendly policies. Wave Transit is expanding, and in any case urgently requires improved downtown facilities to replace the current on-street transfer point. Although the Central Station on Cando Street (near Market Street and College Road) will be Wave Transit's main administrative center and main transfer point, downtown remains an important destination for riders and is still a major transfer point. Downtown will become more important over time as its employment grows and commuter transit to downtown develops from the wider Wilmington region. Greyhound remains committed to moving into the WMTC, which will improve the service it provides to riders, make better connections with other modes of transportation, and encourage new riders. Passenger rail service to Wilmington remains a part of the statewide rail plan, and the WMTC will be a key part of that service.



The functional requirements and space needs are listed in detail in this report. The specification includes the facilities required for all these transportation services. It also includes shared ancillary facilities such as restrooms and building management offices, space for food service, and additional space that can be used flexibly as needs require (for example, for taxi firms, rental car agencies, tour operators, or visitor information).

Key Goals for the Site Layout

The development of the site layout took the following key goals into account.

Transit needs. The principal goal is to provide an attractive, convenient transportation center that works well for riders and for the transportation agencies. It must be able to accommodate not only today's needs but also the likely future needs. It must support the likely pattern of bus routes (most routes are likely to reach the WMTC from the south) and be compatible with the future plans for North 3rd Street and north downtown. As far as possible, pedestrians, buses and private cars should be kept separate to avoid conflicts.

Historic preservation goals. The site is part of a National Register historic district. Campbell Street has three groups of contributing structures (shown in red on the study area map). These are not necessarily historically important in their own right, but are collectively important by contributing to the historic district as a whole. These buildings should therefore be retained if possible. In addition, the brick pavement of Campbell Street (shown in dotted red on the study area map) is an attractive, historic feature that should be retained if possible. However, the bricks are not suitable for heavy bus traffic. Finally, a site layout that preserves the buildings and the brick pavement will have a lower or negligible impact on historic resources, thereby simplifying the project funding and approval processes.



Development potential. In line with its plans and policies, the City wishes to see this area built out to a relatively high density, with building frontages on streets wherever possible. The WMTC site could include development above and/or alongside the rail platforms and bus facilities, possibly through a public-private partnership (PPP).

Neighborhood compatibility. The WMTC should be a 'good neighbor' to the adjoining areas. This includes compatibility with the fledgling residential/arts district to the north-east and the residential district to the east. Ideally, the WMTC and any associated development should make a positive contribution to these neighborhoods. There should also be good linkages with the Cape Fear Community College (CFCC) campus to the west, and the heart of downtown to the south and south-west.



Site Layout Investigation and Conclusions

A total of 28 possible site layouts were sketched for consideration by the Steering Committee. These layouts explored a wide range of options and illustrated the trade-offs between each of the goals.

The key decision is where to provide the bus bays. These are the most complex element to fit onto a site. It is not practical to provide them on or around Campbell Street, because of the need to avoid the historically significant buildings and the brick pavement. This means the bus bays need to be either above the rail platforms (on a concrete deck or 'slab' at street level) or on the U-Haul site south of Campbell Street (including one parcel already owned by NCDOT).



Trackbed – future rail platforms



U-Haul site

The table on the next page compares these two options. In summary:

- **Transit needs:** both options are feasible, but the U-Haul site meets the transit needs better. It allows a better arrangement of bus bays that is more convenient for riders (particularly those making transfers) and is easier for vehicle maneuvers.
- **Historic preservation:** both options support the goal of preserving the character and historic structures/pavement of Campbell Street. However, the U-Haul site is preferable because it also avoids impacts on the character and brick pavement of Hanover Street.
- **Development potential:** the two options provide the best development potential in different places, but are otherwise broadly equal. In the same way, the two options provide scope for first-floor street frontage in different places.
- **Neighborhood compatibility:** the U-Haul site is much better because it keeps the buses on the south, more commercial, side of the site, rather than the north side adjoining the fledgling residential/arts district.

Slab Option	U-Haul Option (Recommended)
Key Features	
<ul style="list-style-type: none"> • Wave Transit and Greyhound buses on a bridge-like slab over platforms • Campbell Street retained as a mixed-use street with drop-off etc. and leasable space. • Rail platforms below grade • U-Haul site not used for WMTC 	<ul style="list-style-type: none"> • Wave Transit and Greyhound buses on U-Haul site • Campbell Street retained as a mixed-use street with drop-off, etc. and future development. • Rail platforms below grade
Meeting Transit Needs	
<ul style="list-style-type: none"> • Approximately 12 off-street bus bays for Wave Transit • Moderate for vehicle movements • Moderate for bus-to-bus transfers • Good for bus-to-train transfers 	<ul style="list-style-type: none"> • Approximately 12 off-street bus bays for Wave Transit • Excellent for vehicle movements • Excellent for bus-to-bus transfers • Moderate for bus-to-train transfers
Historic Preservation Goals	
<ul style="list-style-type: none"> • Retains brick pavement on Campbell Street • Retains contributing structures on Campbell Street • Hanover Street brick pavement likely to be eliminated due to bus traffic 	<ul style="list-style-type: none"> • Retains brick pavement on Campbell Street • Retains contributing structures on Campbell Street • Hanover Street is unaffected
Development Potential	
<ul style="list-style-type: none"> • U-Haul site is untouched and likely to be developed (not connected with WMTC project) • Some scope for building and/or parking near tracks on N 3rd St and Hanover St frontages (coordinating with both rail and bus makes it difficult to develop rest of site) 	<ul style="list-style-type: none"> • Strong scope for building and/or parking on most of the railbed block (relatively easy to coordinate with rail) • Limited scope for development on U-Haul site (could go over buses on N 3rd St frontage, in association with neighboring development)
Neighborhood Compatibility	
<ul style="list-style-type: none"> • Moderate. Buses are on north side of site, alongside fledgling residential. Bus traffic on Hanover Street. 	<ul style="list-style-type: none"> • Excellent. Buses remain in commercial area on south side of site. No need to use Hanover Street.
Other issues	
<ul style="list-style-type: none"> • Potentially costlier than U-Haul option due to slab • Potentially more complex environmental process 	<ul style="list-style-type: none"> • Straightforward, 'doable' to get bus facilities established early

- **Costs:** The slab option would avoid the U-Haul acquisition and relocation costs. However, it would require a concrete structure, similar to a very wide bridge, of approximately 30,000 square feet, costing around \$6 million at current prices. The remaining costs (new buildings, pavement, concourses, canopies, fittings, etc.) are likely to be broadly similar for each option.
- **Other factors:** Acquisition and relocation of the U-Haul site would result in a small loss of employment and tax revenue in the short-term. However, it has several other advantages, in addition to those listed above. It is likely to be easier and quicker to implement an initial set of bus facilities on the U-Haul site; it avoids the need to make decisions now on railroad platform layouts; and it means the bus facilities and the development of the northern part of the site (rail and buildings) can proceed on separate schedules, without interfering with each other.

For these reasons, the study team and the Steering Committee recommend purchasing the U-Haul site for use as part of the Transportation Center. It is an investment that will be repaid in a facility that works best for transit, preserves historic structures, is easier to implement, and will be a ‘good neighbor’.



The downtown trolley would stop alongside the WMTC



Example of new transit building (pink, in center) inserted into historic frontage. Bus bays behind. Stockton, California

Recommended Site Layout

The numbered items below refer to the site plan at the end of this summary, and describe its key design features. More detail is given in the main text of the report.

1. Two concourses for Wave Transit buses, facing east to reflect the predominant pattern of routes, with most routes arriving/departing to/from the south. The second concourse could be omitted initially and only built when required. The concourses are shown with individual canopies, but the entire bus facility could be fully covered. The two concourses, along with the south side of the rehabilitated Neuwirth building, can accommodate up to twelve full-size Wave Transit buses at any time. This is not quite the target figure of fifteen. However, if necessary, additional buses can be accommodated in the Greyhound bays (when not occupied by Greyhound vehicles) or at the adjoining curbs on North 3rd Street or North 4th Street (particularly for buses that are using those streets anyway and would be passing by the site, such as the current route 101).
2. Bays for Greyhound buses. These are laid out to Greyhound's requirements.
3. Paratransit vans would use the curb on the south side of the Neuwirth Building, which can accommodate three vans comfortably and four vans if required. If this space were needed for full-size buses, the vans could use Campbell Street or any available bus bay.
4. The existing downtown trolley route and a potential additional trolley route in the reverse direction can stop on North 4th Street, without deviating from their route, or can use any of the bus bays if that is preferred.
5. The existing Neuwirth building would be rehabilitated and would be used for Wave Transit ticketing, Wave Transit waiting, and potentially other facilities such as restrooms.
6. A new building facing Campbell Street would fill the gap between the Neuwirth building and the Thomas Grocery building. The south side would be a Greyhound waiting area, and the north side would be a lobby for arrivals, people waiting to be picked-up, etc. This building would also likely accommodate Greyhound ticketing/baggage and some ancillary facilities such as restrooms. It would likely be a two-story building with the upper level devoted to back offices and/or a void above the waiting or lobby areas. It could provide an airport-quality experience for riders, along with an exterior frontage that respects the historic character of the street.
7. The Thomas Grocery building would be rehabilitated. It could accommodate ancillary facilities such as back offices, or could be street-oriented leasable space, or a combination of both. It might be the best location for a 'bicycle station'. This would provide tune-ups, repairs and possibly valet service for commuters, and could also provide bicycle rental for visitors. Bicycle stations are typically operated by a local bicycle store as a concession.
8. Campbell Street would be the subject of a full streetscape plan, recognizing its multiple roles: as the point of arrival/departure for many riders, as a historic street, and as the street serving future development on the north side. To accommodate the expected

traffic patterns, on-street parking bays would be created in place of the current grass buffers. These would be used for drop-off and pick-up (short-stay parking), a taxi stand, and accessible (ADA) parking. Additional parking space would also be available on North 4th Street. The brick surface would likely be restored on top of a new base, as has successfully been done for similar streets in Wilmington. The current concrete area in front of the Neuwirth building would be re-landscaped to provide a focal point, visible from North 3rd Street.



9. North of Campbell Street, almost the entire block would be available for future development, possibly as a public-private partnership. This would likely include a strong building frontage on North 3rd Street, similar to the office buildings recently constructed on that street. The frontages on Hanover Street, North 4th Street and Campbell Street would likely reflect the character of those streets. Rail facilities (ticketing, waiting, etc.) would likely be provided at street level within that development. The north-west corner of the block, fronting Hanover Street, is suitable for a small parking deck, which could be used in part for rail passengers' parking.
10. The rail platforms would be below street level, at a similar level to the current parking lot. The site can accommodate up to three platforms, which could be built individually as required.
11. The corner of North 3rd Street and Campbell Street, on this block, would be a focal point. It is where the rail and bus facilities would meet (either side of Campbell Street) and would connect to a future pedestrian tunnel under North 3rd Street to the Cape Fear Community College campus and the waterfront. This pedestrian link would form part of the trail proposed in the Downtown Plan.

What Happens Next?

With this study, the City of Wilmington, Wave Transit, NCDOT Rail Division and NCDOT Public Transportation Division are asked to approve the recommended site layout as the basis for design.

The City is asked to commit to purchase of the U-Haul site and to provide the 10% local match.

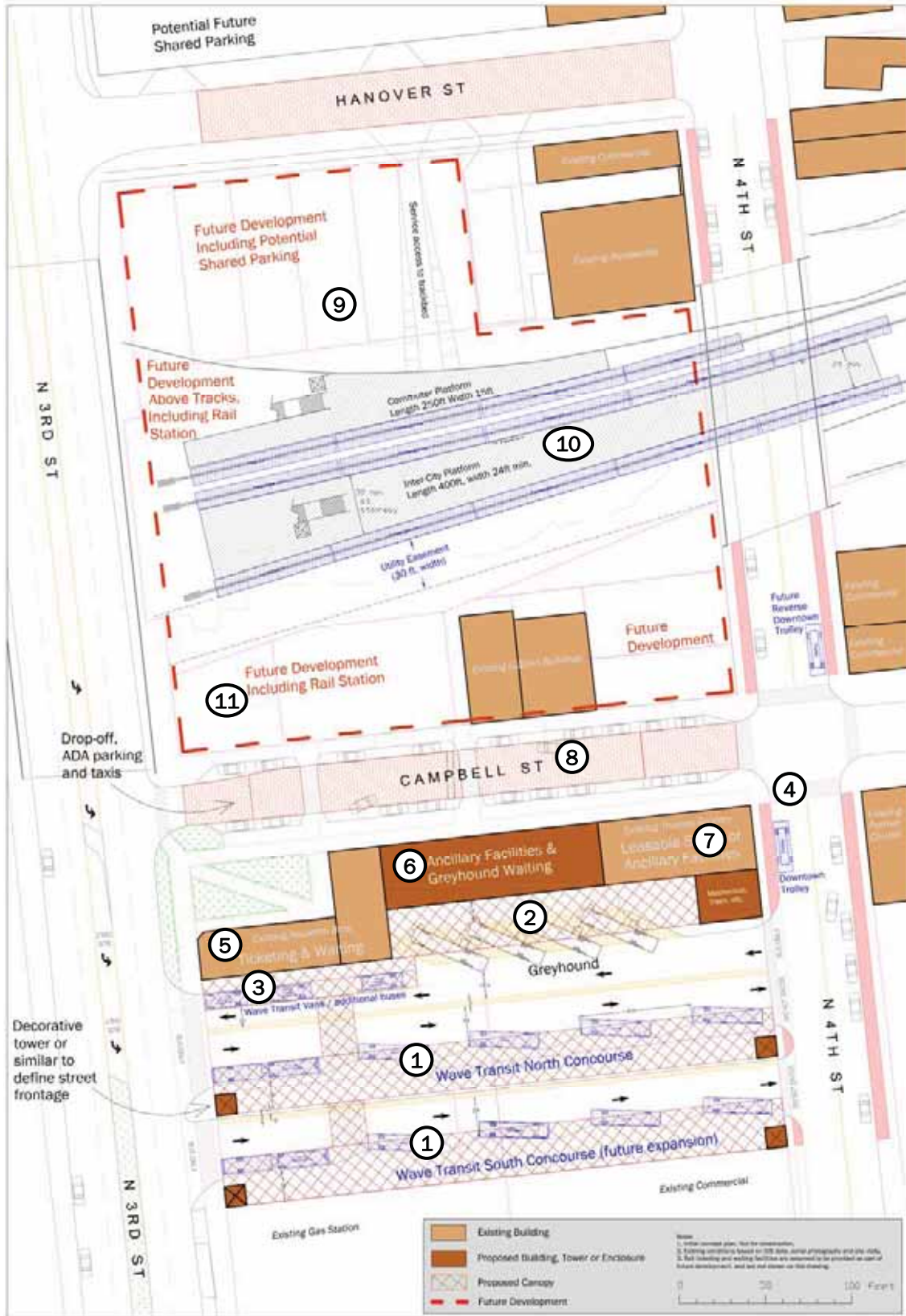
If these recommendations are accepted, the next steps are for NCDOT, working with the City and Wave Transit, to:

- Make the purchase, through agreement or condemnation.
- Undertake initial site preparation, including removal of unwanted buildings and other clean-up tasks.
- Begin identifying potential funding sources for an initial phase that provides the bus facilities and enhances Campbell Street.
- Take the design process to the next level of detail.

Downtown Multi-Modal Center Recommended Site Layout

Figures in circles refer to description in text

May 1, 2009
Concept plan
Not for construction



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1 Introduction

1.1 Purpose of Study

The City of Wilmington and the North Carolina Department of Transportation (NCDOT) propose to build a transportation center, known as the Wilmington Multi-Modal Transportation Center (WMTC), in downtown Wilmington. NCDOT wishes to determine the land requirements and finalize the purchase of any additional land that may be needed, as well as determine which existing buildings on the site should or could be retained. NCDOT and the City therefore commissioned this study to determine the space and operational needs of the various transportation functions expected to use the WMTC, and to prepare a functional site plan.

The transportation functions could include inter-city and commuter rail service, local bus service (Wave Transit), paratransit and any other transit services operated by human service agencies, regional/other county transit services, rural transit, inter-city bus (Greyhound), and taxis. Previous studies have identified the specific space and operational requirements of some of these transportation services, but some of these may now be out of date. The purpose of this study is to identify existing, planned, and longer-term potential transportation services, and determine the programming needs of each of these for the site.

The analysis will determine the basic space and operational needs for identified services based on current plans and any additional anticipated services. However, other potential services that are not included in any plans but, through discussions, are determined to be a possibility for Wilmington and surrounding area will be assessed for their impact and demands on the multi-modal center.

1.2 Proposed Site

Figure 1.1 shows the proposed WMTC site. It is bounded by North 3rd Street and North 4th Street to the west and east respectively, and Hanover Street to the north. To the south, the site may end near Campbell Street, or may potentially extend further toward Red Cross Street if this is required to accommodate the full range of functions. This potential extension is shown by the dotted line on Figure 1.1. NCDOT already owns one of the four parcels in this area. The other three parcels in this area are currently owned by a U-Haul franchisee, and are in use for vehicle rentals and self-storage. This is one of several U-Haul locations in the Wilmington urban area.

1.3 Study Process

The study was led by a Steering Committee which included representatives of:

- NCDOT Rail Division
- NCDOT Public Transportation Division
- Cape Fear Public Transportation Authority (doing business as 'Wave Transit')
- City of Wilmington Transportation Planning Section / Wilmington MPO

The study was undertaken by a consulting team from Martin/Alexiou/Bryson and Moffatt & Nichol, working with the Steering Committee, other transportation providers, and other stakeholders.

The study process included:

- Reviewing background information, including previous studies for the WMTC, other transportation and land-use plans, and other community plans and projects (described in **Section 2** of this report).
- Estimating the potential growth in local transit service over the lifetime of the WMTC, in order to update the requirements for vehicle/waiting/building space (**Section 3**).
- Contacting stakeholders (including potential transportation providers and other downtown stakeholders) to understand their views and aspirations for the WMTC (**Section 4**).
- Using this information to update the functional requirements and space needs for the WMTC (**Section 5**).
- Assessing the site characteristics and how they might affect the design options and choices (**Section 6**).
- Developing a range of possible site layouts, developing a shortlist of the most viable options, and deciding on the recommended option (**Section 7**).

Figure 1.1 Existing Site Plan



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2 Background Information

2.1 Previous Multi-Modal Transportation Center Studies

2.1.1 Feasibility Study (2000)

The concept of the Wilmington Multi-Modal Transportation Center (WMTC) was first addressed in detail by a Feasibility Study in 2000¹. That study confirmed the need for the WMTC and examined a range of possible locations, both downtown and elsewhere. It concluded that a downtown location was preferable. The study also developed a set of functional requirements for the WMTC. These are reproduced in Appendix 1 for ease of reference.

The study selected a site between North Front Street and North 2nd Street, north of Red Cross Street. This was known as the Police Headquarters site or the Red Cross Street site. In fact, the original passenger rail station had been on this site. The site would become an integrated multi-use complex with not only the transportation facilities but also retail and office space, as well as a relocated Wilmington Railroad Museum. (Because the Police Headquarters site was subsequently rejected, that site is not considered further in the present report.)

The study also considered but rejected an alternative site, between North 3rd Street and North 4th Street. This is similar to the site that is now (in 2009) proposed for the WMTC, so it is useful to consider how the 2000 study looked at this site. Appendix 2 reproduces the 2000 study's concept plan for the site, and includes that study's sketches laid over today's aerial photograph.

2.1.2 Site Evaluation Report (2004)

The WMTC was addressed again in a Site Evaluation Report in 2004². The question of the preferred site had been reopened in 2003, in part due to the dissatisfaction of some stakeholders with the preferred site and its selection process. The impact on Cape Fear Community College (CFCC) and its expansion plans was a particular issue.

The site evaluation study was therefore undertaken to (1) validate information about the sites that had been studied in the past, (2) collect new information about the sites from key stakeholders, and (3) develop recommendations for suitable sites.

The study considered several potential areas in and around Wilmington, and reaffirmed the view that downtown was the preferred area. Within downtown, six specific sites were evaluated, including the Police Headquarters site and two permutations of the North 3rd Street / North 4th Street Site.

¹ *The Wilmington Urban Area Multi-Modal Transportation Center Feasibility Study*. Parsons Brinckerhoff Quade & Douglas, Inc., Morrisville, NC. May 8, 2000.

² *Wilmington Multi-Modal Transportation Center Site Evaluation Report*. The Louis Berger Group, Inc., Cary, NC. December 2004.

The study included a set of functional requirements for the WMTC, broadly based on the requirements listed in the 2000 study but with some changes. These are reproduced in Appendix 3 for ease of reference.

The study concluded with a preference for two sites, one of which was the North 3rd Street / North 4th Street site south of the railroad (Site #5 in that study, as shown in Appendix 4). The City Council subsequently endorsed the North 3rd Street / North 4th Street site.

Key implications for the WMTC:

- The functional requirements identified in previous reports are a very useful starting-point and will be updated in this study.

2.2 Anticipated Population and Employment Growth

The future rate and location of population and employment growth in the Wilmington metropolitan area will be key factors in estimating the area's long-term transit needs.

Table 2.1 summarizes the most recent population and employment projections made for Wilmington. Figure 2.1 shows the forecast population change by Transportation Analysis Zone (TAZ). These forecasts were made as part of an update to the regional travel demand model, and took account of developments in the pipeline as well as constraints to development and local planners' views of where future development was most likely to take place. The TAZ-level forecast should therefore be seen as a 'best guess' of the broad locations of development, but not as a firm estimate for any individual TAZ.

The urban area is expected to see a 75% increase in population between 2005 and 2035, with an 86% increase in employment. In Wilmington itself (the 'Central New Hanover' region in the population forecasts), there is expected to be 39% population growth and 63% employment growth. This is likely to be through infill of the remaining undeveloped areas as well as denser second-generation development of some existing developed areas within the city. The strongest growth rate is expected in Pender County, where a doubling of population is forecast in the Pender part of the Wilmington urban area. However, this is from a low base, and so Pender represents a relatively small proportion of the region's growth. The City of Wilmington and northern New Hanover County make the largest impact, with each contributing around a quarter of the region's growth.

Key implications for the WMTC:

- The Wilmington urban area is expected to nearly double in population within the likely lifespan of the WMTC. This is due to a combination of factors: expansion of the urban area, infill of the remaining undeveloped parts of Wilmington, and densification of existing urban areas.
- All else being equal, this would be expected to lead to a proportionate increase in fixed-route transit service, with new routes into the newly-urbanized areas as well as

possibly an increase in route density in existing urbanized areas. This will be addressed in more detail in Section 3.

- The increase in transit service could be diminished if the additional population is predominantly suburban-oriented with a low likelihood of using transit. Conversely, it could be magnified if future development patterns are more transit-oriented than hitherto, or if wider trends produce a national-level increase in transit ridership. This is a major uncertainty for planning the WMTC.

Table 2.1 Forecast Population and Employment Growth

Population

Year	Scenario	Central New Han	North New Han	South New Han	North Brunswick	South Pender	Total Study Area
2005		98,776	45,981	33,178	22,682	8,738	209,355
2010		106,025	53,274	38,487	26,901	10,900	235,586
2015		113,242	60,867	43,706	31,506	13,599	262,920
2020	No bridge	120,202	68,513	48,779	36,252	16,700	290,446
2025	No bridge	126,676	75,962	53,649	40,896	20,067	317,250
2030	No bridge	132,436	82,966	58,258	45,193	23,566	342,419
2035	No bridge	137,256	89,276	62,549	48,899	27,061	365,041
2020	Bridge	120,103	68,355	48,788	36,752	16,651	290,649
2025	Bridge	126,468	75,619	53,672	41,985	19,959	317,703
2030	Bridge	132,149	82,472	58,300	46,775	23,406	343,101
2035	Bridge	136,960	88,724	62,616	50,695	26,872	365,866
	Growth from 2005	39%	93%	89%	123%	208%	75%
	Growth from 2005	38,183	42,743	29,438	28,013	18,134	156,511
	% of regional growth	24%	27%	19%	18%	12%	100%
2020	Bridge Impact	-98	-158	9	500	-49	203
2025	Bridge Impact	-208	-343	23	1,089	-108	453
2030	Bridge Impact	-287	-494	42	1,582	-161	682
2035	Bridge Impact	-296	-552	67	1,795	-190	825

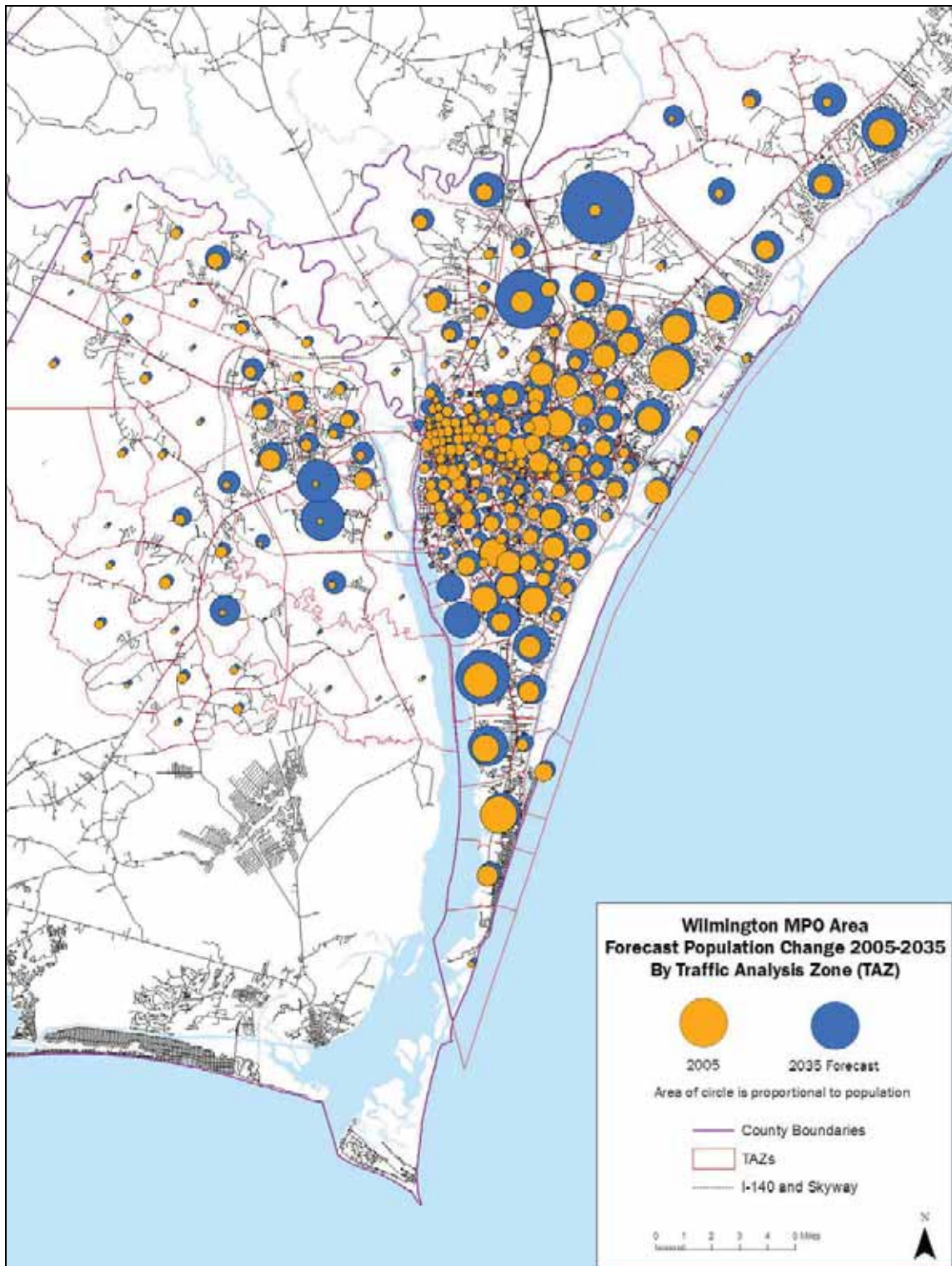
Employment

Year	Scenario	Central New Han	North New Han	South New Han	North Brunswick	South Pender	Total Study Area
2005		72,981	18,527	6,579	5,240	959	104,286
2010		81,409	20,576	7,581	6,281	1,386	117,234
2015		90,097	23,145	8,598	8,178	1,999	132,017
2020	No bridge	98,625	26,014	9,600	10,853	2,762	147,855
2025	No bridge	106,575	28,968	10,556	14,230	3,638	163,967
2030	No bridge	113,526	31,789	11,435	18,232	4,591	179,574
2035	No bridge	119,062	34,259	12,207	22,781	5,584	193,893
2020	Bridge	98,536	25,843	9,609	11,252	2,720	147,958
2025	Bridge	106,380	28,579	10,582	15,136	3,540	164,216
2030	Bridge	113,243	31,187	11,487	19,640	4,434	179,990
2035	Bridge	118,740	33,502	12,296	24,568	5,375	194,480
	Growth from 2005	63%	81%	87%	369%	460%	86%
2020	Bridge Impact	-90	-172	9	398	-42	103
2025	Bridge Impact	-195	-390	26	906	-98	249
2030	Bridge Impact	-284	-602	52	1,408	-158	417
2035	Bridge Impact	-322	-758	89	1,787	-209	587

New Han = New Hanover county
 Bridge = assuming the Cape Fear Skyway is built
 No bridge = assuming the Cape Fear Skyway is not built

Source: Socio-Economic Forecasts made in 2006 by Tommy Hammer for the 2007 Travel Demand Model Update.

Figure 2.1 Forecast Population Change 2005-2035, by TAZ



Source: Socio-Economic Forecasts made in 2007 for Wilmington Travel Demand Model Update

2.3 Wave Transit

Wave Transit is the operating name of the Cape Fear Public Transportation Authority. Wave is an integrated agency covering the whole of New Hanover County, resulting from a merger in 2004 of the former Wilmington and New Hanover transit agencies.

The fixed-route service consists of nine routes within the Wilmington urban area east of the Cape Fear River and an additional route into Brunswick County. Wave also operates a free downtown circulator and Seahawk Shuttle routes serving the University of North Carolina – Wilmington (UNCW) campus area. Wave Transit also operates curb-to-curb paratransit service under the name Dial-a-Ride Transportation (DART).

2.3.1 Fixed-Route Service

The current route structure was introduced on March 31, 2008, and represented a major shift in line with the recommendations in the WAVE Short-Range Transit Plan (Section 2.4 below). Since the previous restructuring in 1974, the area had grown tremendously and the old route structure concentrated public transportation services to a very compact area where many routes overlapped one another. While this configuration was convenient to the passengers who lived and traveled in this area, it failed to offer other areas of the county access to fixed-route transit service.

The new route structure includes an expanded service area. The primary transfer location will be located at the authority's new transfer and administration facility to be constructed on Cando Street. Temporarily, transfers are occurring on Columb Drive behind Target. This location is known as 'Central Station'; it has also been described as 'Market Station' in the past. In addition to Central Station, there are two other major transfer points:

- Downtown Station, at North 2nd Street and Princess Street. This transfer point is expected to move to the WMTC in due course.
- Independence Station, at Independence Mall on Independence Boulevard. This transfer point is expected to remain for the long-term.

The base service pattern is hourly. Some routes operate half-hourly during peak service (Monday-Friday daytime). Figure 2.2 shows the relationship between the main transfer points in the current schedule. Up to four buses, plus potentially the downtown trolley, are scheduled to be at the downtown transfer point at any time. This is important, because it means that even though Central Station is the main hub, the downtown transfer point can and does still have a substantial hub role. (The schedule introduced March 31, 2008 had five buses plus potentially the downtown trolley present at any one time, but subsequent revisions have reduced this pulse to four buses plus potentially the downtown trolley.)

Figure 2.3 shows the current routes through downtown.

Figure 2.2 Existing Wave Transit Nodes and Pulses

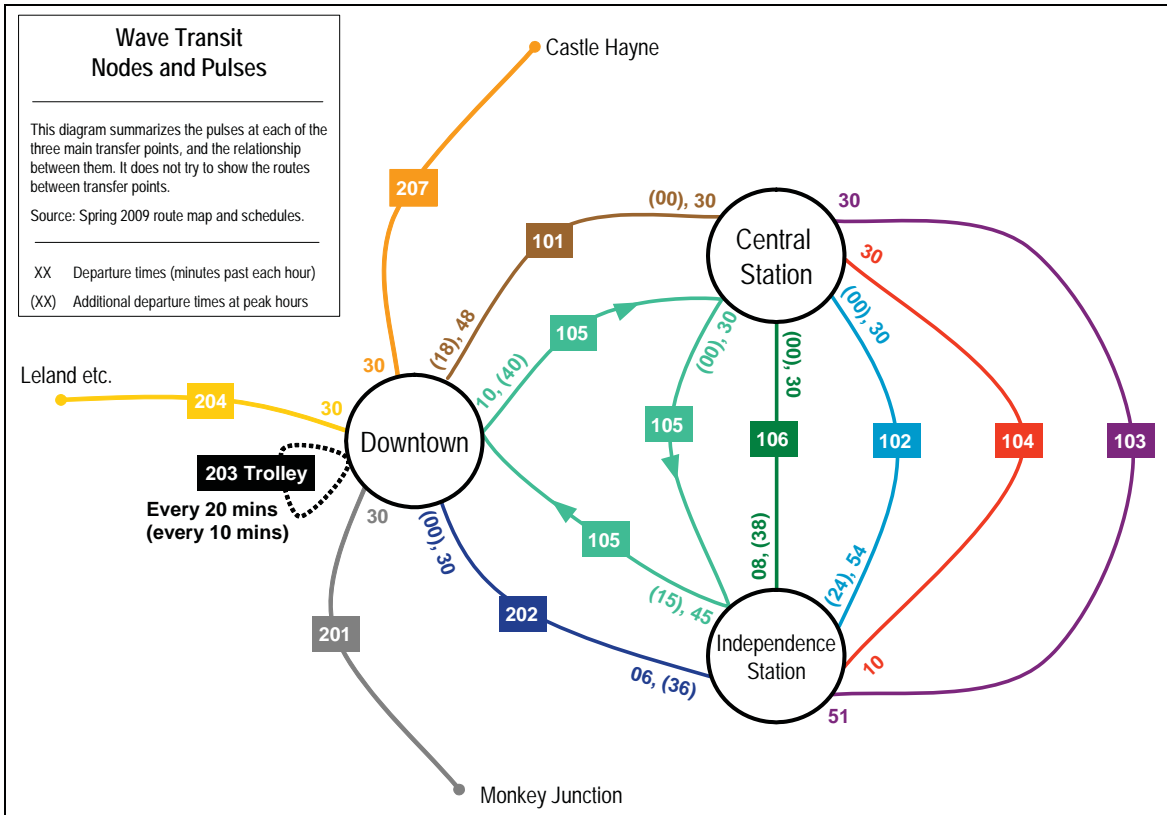


Figure 2.3 Existing Wave Transit Routes Through Downtown



Source: Wave Transit Route Map dated January 30, 2009. Proposed WMTC site added for clarity.

2.3.2 Current Issues for Wave

After an initial drop in passengers following the restructuring in 2008, ridership levels have rebounded to their 2007 levels. In response to the initial reaction from patrons, Wave Transit held a series of public input meetings designed to listen to passenger concerns. These meetings led to minor modifications to many of the routes, additional bus stops, and improved amenities.

Wave Transit envisions continued minor modifications to the new routes. Although the transition was initially challenging, it believes that most passengers have come to understand the new routes. The public input also prompted staff and the route committee to develop an additional route to serve New Hanover Regional Medical Center and the Longleaf Park neighborhood. Once funding can be identified, the new route will be implemented.

One pattern that has emerged is passengers' continued desire to use downtown Wilmington for transfers, even though it is on the western edge of the service area. Wave therefore expects that the future WMTC will most likely serve as a transfer location with passenger counts that are comparable to Central Station.

Key implications for the WMTC:

- Downtown is likely to remain both an important destination and an important transfer location for Wave Transit riders, notwithstanding the additional transfer locations now available. It is therefore still reasonable to make provision for 'pulses' and layovers at the WMTC.
- The current peak-period pulse at downtown is four buses and the trolley. This represents a starting-point for determining Wave Transit's bus bay needs.
- The presence of three pulse locations gives Wave Transit a very different route structure from that of peer cities. This complicates the use of a peer comparison as a means of understanding possible transit futures.

2.4 WAVE Short-Range Transit Plan

The current WAVE Short-Range Transit Plan was adopted in 2004³. The key proposals in that plan, which looked out to 2010, were:

- A restructuring of the fixed-route service. This restructuring was implemented in 2008 as described above. However, funding constraints have meant that not all of the routes envisaged in the plan have been implemented so far. In addition, the routes have been revised and do not necessarily correspond exactly to the plan's proposals.

³ *Wave Short-Range Transit Plan*. Kimley-Horn and Associates, Inc., February 2004.

- Relocation of the administrative facility to a new central site at Market Station (now known as Central Station). This is in progress, and a temporary transfer point has been created near that location.
- Creation of a temporary hub in downtown Wilmington, prior to completion of the WMTC. The existing on-street transfer point performs this role. The plan referred to the future WMTC and recognized that a site selection study was (at the time) under way.
- Creation of three ‘satellite stations’ at or near Monkey Junction, Independence Mall and Mayfaire. A study in 2008 examined these in more detail⁴. A site at Independence Mall was identified and is now in operation with an initial layout pending funding of long-term facilities. At Monkey Junction, a recommended site was identified but because only one route currently serves the area, implementation has been deferred. At Mayfaire, the study concluded that the best approach was to look for a site in the ‘triangle’ of Eastwood Road, Military Cutoff Road and Wrightsville Avenue, rather than at Mayfaire itself; this will be progressed as opportunities arise through development proposals.

Figure 2.4 shows the routes that were proposed in the plan. The aspiration was to ultimately provide 30-minute headways on all standard routes (i.e. not the Brunswick Connector or the Seahawk Shuttles).

Table 2.2 lists the plan’s proposed routes, and comments on whether these are currently in place. This comparison aims to find out whether there are any routes serving downtown that were envisaged in the plan but have not yet been implemented; these would represent potential growth that the Multimodal Center should be designed to accommodate. There is one such route: the Airport Shuttle.

The plan also recognized the fact that paratransit service, as then operated, created a high operating cost burden. The plan identified several possible options for restructuring the service. These options are listed for reference in Appendix 5. The way paratransit is operated may have a bearing on the facility needs at the WMTC, because under some operating models the WMTC could act as a transfer point between vans, or between a van and a fixed-route service. However, the current operating model appears likely to continue in the future, as described in Section 2.6.

As well as the detailed operational plan leading to 2010, the plan also took a broad look at potential longer-term needs. Table 2.3 lists the potential needs that it identified. These included new services within New Hanover County, as well as increased coordination with areas further afield.

⁴ *Wave Transit Satellite Transfer Stations: Evaluation of Site Locations and Planning: Final Report, March 2008.* Martin/Alexiou/Bryson, PLLC, Raleigh NC.

Key implications for the WMTC:

- Full implementation of the plan would result in one more route (the Airport Shuttle) serving downtown than at present. If the additional route was on-pulse, this would result in a pulse of five buses plus the downtown trolley.
- The plan anticipated that additional routes may be required in the longer-term. Section 3 of this report estimates how this may play out within the life of the WMTC, and therefore the number of bus bays that the WMTC should aim to provide.

Figure 2.4 2004 WAVE Short Range Transit Plan: Recommended Routes

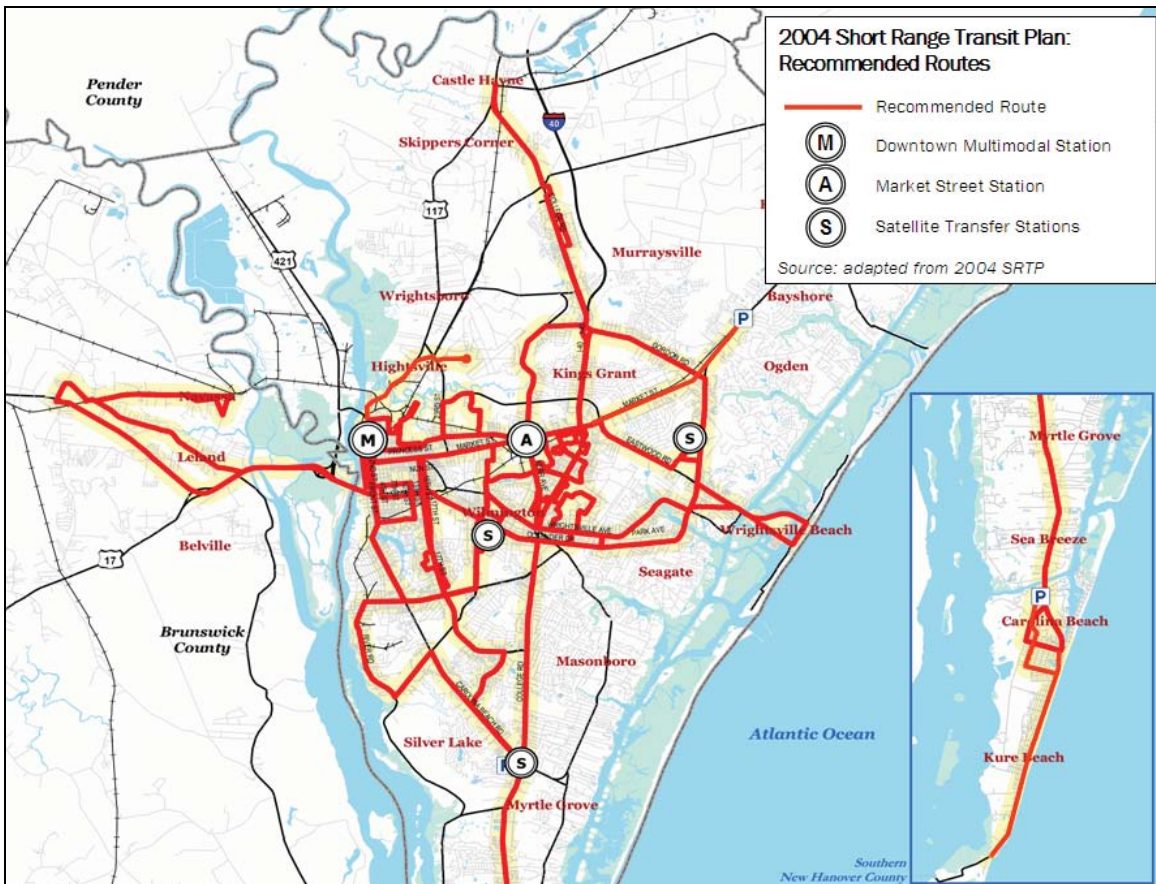


Table 2.2 Comparison Between 2004 Route Proposals and 2008 Routes

SRTP Proposal				Status in December 2008
Route Name	Serves downtown?	Implementation Phase	VOMS *	
North-South Express	No	2	5	Not implemented. Partly covered by #207 Castle Hayne.
Wrightsville Beach	No	2	2	Ongoing aspiration to provide service to Wrightsville Beach. Wilmington section mostly covered by #103 and #104
Central Loop	No	2	2	Essentially #104
New Hanover Regional Medical Center	No	2	1	Essentially #105
Oleander	Yes	2	2	Essentially #202
Southwest Loop	Yes	2	2	No direct equivalent – covered by several routes
North Side / Princess Place	Yes	2	2	Essentially #101
South Loop	Yes	2	2	Essentially #201
Carolina Beach	No	4 (weekends only)	1 (trolley, weekends only)	Being considered by Town of Carolina Beach
Brunswick Connector	Yes	2	2	Essentially #203
Porter's Neck	No	5	1 cutaway	Not implemented
Airport Shuttle	Yes	4 (weekends), 6 (Monday-Friday)	1 cutaway	Not implemented
UNCW Routes	No	2	4 cutaways	Ongoing
Front Street Trolley	Yes	2	1 trolley	Ongoing

* VOMS = vehicles operated in maximum service

Sources: 2004 WAVE Short-Range Transit Plan; March 2008 Route Map

Table 2.3 Long-Term Actions Identified in the 2004 SRTP

6 to 10 Years
<ul style="list-style-type: none"> • Initiate/continue regional transportation/transit coordination with areas currently outside of New Hanover County and study portions of Brunswick County • Complete a system efficiency analysis • Update the 5-year transit plan • Study the potential for a reduction of vehicle headways • Study the potential for deployment of intelligent transportation systems (ITS) measures and other roadway improvements on routes to improve service. Improvements could include queue jump lanes, signal pre-emption/priority, turn lanes, bus lanes, bus bays, and dedicated transit facilities • Deploy/construct ITS and roadway improvements to improve system operations • Initiate a vehicle replacement/fleet management program • Re-assess system priorities • Adjust existing services
Beyond 10 Years
<ul style="list-style-type: none"> • Identify whether there is potential for the formation of a multi-county transportation authority (Pender County/New Hanover County/Brunswick County) • Reassess priorities • Adjust existing services • Add new services • Enhance existing transit facilities

2.5 Wilmington MPO 2030 Long Range Transportation Plan

The WMPO 2030 Long Range Transportation Plan (LRTP) outlines transportation projects, goals, and objectives to improve overall travel within the Wilmington urban area. The current plan⁵ was adopted in 2005, and covers a 25-year period to 2030.

The plan notes that the Wilmington urban area had experienced a steady growth in population and employment in the previous 25 years. It had grown from a somewhat isolated area with a small city and small towns, to a larger metropolitan area. It was expected to continue to grow.

The plan recognized the value of transit as part of the integrated metropolitan transportation system. In particular:

Population forecasts for the study area indicate a potential population increase of more than 60 percent in the next 25 years. Growth of this magnitude will obviously affect transportation, and it is unlikely that funding for transportation will increase as rapidly as demand. Coupled with this is the 2000 U.S. Census statistic that indicates that 82 percent of New Hanover County residents (79 percent in Brunswick County) drive to work alone in a personal vehicle. An obvious solution is to increase transit use.

⁵ *Wilmington Metropolitan Planning Organization 2030 Long Range Transportation Plan*. Wilmington MPO, January 2005.

Table 2.4 lists the plan's goals and objectives for public transportation. The plan recognized that:

Some of the public transportation services within the Wilmington Urbanized Area such as intercity bus service, charter bus service, regular and shared taxi service, and most social/health related special transportation services, are privately owned and operated. As a result improvements of these services will likely take place as a result of market forces rather than by government policy initiatives at the regional and/or local levels. Most of the recommended improvements [in the LRTP] pertain to transportation services owned and operated by public or quasi-public agencies such as the public transit system.

The plan's recommendations for Wave were essentially those of the WAVE Short-Range Transit Plan. The financial plan assumes that the projects listed in the transit plan, when implemented, are carried forward to 2030 – that is, it assumes no additional routes beyond the transit plan's proposals.

Key implications for the WMTC:

- The LRTP has no firm plans, or even identified corridors, for additional Wave Transit routes beyond those of the WAVE Short-Range Transit Plan. However, it is clear that transit is seen as an important need for the entire urban area, not simply as a legacy service for transit-dependent neighborhoods. This means that it is realistic to assume that transit service will seek to expand as the urban area expands.

Table 2.4 Transit Goals and Objectives in the 2005-2030 L RTP

General	
Goal 1:	Develop and maintain a public transit system that is conveniently accessible to all residents and visitors within the Wilmington Urbanized Area.
	Objective 1.1: Ensure, as practicable, that all residents and major attractions centers such as schools, shopping centers and major employers have transit service within ¼ mile walking distance.
	Objective 1.2: Include transit operations in the design of street infrastructure and land use development whenever practicable.
Goal 2:	Develop and maintain a public transportation system that provides convenient access for a variety of trip destinations and purposes.
	Objective 2.1: Provide a diverse system of transit routes that minimizes transfers.
	Objective 2.2: Support the development and implementation of a public transit route system and support facilities that effectively combine appropriate elements of radial, feeder/trunk and circumferential service.
Goal 3:	Develop and maintain a public transportation system that serves travel needs over a variety of times of day and days of the week.
	Objective 3.1: Support prudent, incremental extensions in the hours and days of operations of the transit system.
Goal 4:	Facilitate increasing levels of ridership on the public transit system.
	Objective 4.1: Support effective marketing and responsiveness to consumer needs of transit service in the region.
	Objective 4.2: Support the implementation of employer incentive strategies and activities (such as subsidized bus pass programs) that encourage the diversion of commute trips away from the single-occupant vehicle onto the public transportation system.
Goal 5:	Develop and maintain affordable transit service throughout the urban area.
	Objective 5.1: Support regional efforts to identify and implement transit funding strategies and programs that will provide adequate, long-term, stable revenue source(s) for the public transportation system.
	Objective 5.2: Maintain a system of transit fares that balances the need for passenger revenues with the goal of maximizing ridership.
ADA/Elderly-Related Services	
Goal 1:	Convenient, economical, and safe transportation services for the disabled and elderly residents of the Wilmington Urbanized Area.
	Objective 1.1: Consistent with the adopted Cape Fear Public Transit Authority's Transit Master Plan, provide transportation services which adequately meet the needs of the elderly and disabled populations in the region.
	Objective 1.2: Support the continued development and implementation of accessible fixed-route and appropriate complementary paratransit services which are identified in the adopted Cape Fear Public Transit Authority's Transit Master Plan.
Inter-city Bus and Rail Service	
Goal 1:	An integrated transportation system that provides convenient service in the interregional and interstate corridors.
	Objective 1.1: Support public and private efforts to develop and implement appropriate expansions of bus and rail service between the Wilmington Urbanized Area and locations outside the region.

Source: 2030 L RTP, pages 118-119.

2.6 Coordinated Human Service Transportation Plan

In December 2008, the Wilmington area's first Coordinated Human Service Transportation Plan was published. The plan was created because Federal law now requires a locally-developed, coordinated public transit/human service planning process (and a corresponding plan) as a condition of receiving funding for certain programs directed at meeting the needs of seniors, people with disabilities and low-income populations. The plan must be developed through a process that includes representatives of public, private and non-profit transportation providers; representatives of public, private and non-profit human service providers; and participation by the public. The plan therefore identifies transportation needs, provides strategies for meeting local needs, and prioritizes transportation services for funding and implementation. Wave Transit acts as the lead agency.

The plan identifies the services currently available as:

- Fixed-route public transit service in New Hanover County and northern Brunswick County.
- Complementary ADA paratransit services within $\frac{3}{4}$ mile of fixed routes.
- Brokered paratransit services offered by Wave Transit throughout the county and to specialized medical facilities in Chapel Hill and Durham.
- One ADA compliant taxicab.
- A very small number (less than 15) of human service vans or light transit vehicles to provide private and non-profit transportation services.

The plan goes on to identify the transportation needs of local organizations. Those needs are reproduced in Table 2.5 below. The plan responds to those needs in the following terms:

The committee and those surveyed who did not attend the planning meeting were confident that the structure and service offerings of Wave Transit were meeting many of the needs of the community. By operating as a single entity, Wave Transit offers the ability to more efficiently, economically and effectively manage a complex public transportation program with a variety of offerings.

As with any program, there were gaps identified. Most of the deficiencies could be met by providing expanded fixed route public transportation services. This includes: more frequent service (reduced headways); later evening service; expanded weekend service; and a larger service area. To address this deficiency, the authority is working on legislation that would allow a local option sales tax to improve public transportation. Should these efforts be successful, the committee would be asked to prioritize the needs based on specific revenue levels.

To meet the pedestrian safety needs identified, the authority will rely on the MPO to lead the effort to make the area more pedestrian friendly. To meet the shortfall in amenities, the authority is embarking on a plan to partner with private interests in an effort to increase available benches and shelters at fixed route bus stops. The authority has also identified the need to work with surrounding counties to prevent duplication of services and streamline access to available public transportation programs. Finally, cooperation between all interested agencies could be accomplished by keeping the coordinated planning group involved and engaged as additional funding becomes available.

Table 2.5 Needs Identified in the Coordinated Human Service Transportation Plan

PRIMARY TRANSPORTATION NEEDS OF LOCAL ORGANIZATIONS

1. Fixed route bus service needed in Hampstead and Burgaw in Pender County, Porter's Neck and Scotts Hill on the New Hanover/Pender County line and fixed route service in other rural areas of the above counties.
2. Expanded service hours for fixed route buses during the weekdays.
3. Fixed route bus service needed in northern New Hanover County in the Ogden area.
4. Pedestrian safety improvements, such as crosswalks, wheelchair ramps, and sidewalks, needed near bus stops.
5. Fixed route bus service needed for more low income areas in New Hanover County.
6. Special transportation services needed for victims of domestic violence.
7. More amenities, such as benches and shelters, are needed along fixed bus routes in New Hanover County.
8. Special transportation services needed for initial employment periods for individuals who may not qualify for the New Hanover County Work First Program.
9. Cooperation between organizations in the area needs to be established rather than each organizations working independently of one another.
10. Low income individuals need low cost or free transportation service.

NOTE: All of the above priorities will be more specified in detail as agencies and organizations develop their specific transportation needs.

SECONDARY TRANSPORTATION NEEDS OF LOCAL ORGANIZATIONS

1. Bus service needs more frequent routes in New Hanover County and the City of Wilmington.
2. Taxi cabs need to offer more accessibility and services to individuals.
3. There is a need for more bi-lingual transit information to be offered.
4. All local organizations need translators for individuals who may not speak English.
5. Education to notify individuals about local transit services is needed.
6. Programs need to be implemented for individuals who may be mentally challenged.
7. Food delivery services need to be implemented for those individuals who do not have the ability to get food on their own.

NOTE: All of the above priorities will be more specified in detail as agencies and organizations develop their specific transportation needs.

Source: Coordinated Public Transportation Human Service Transportation Plan for Southeastern North Carolina, December 2008.

Key implications for the WMTC:

- From this plan, and from additional discussions with Wave Transit, it appears that the human service transportation situation is relatively stable and there is no prospect of major changes that would greatly affect the WMTC's site needs.
- However, the plan also provides further evidence that the WMTC should be able to cater for substantial expansion in the level of *fixed-route* service.

2.7 Choices: The City of Wilmington Future Land Use Plan 2004-2025

The future land use plan (FLUP), adopted in 2004, sets the framework within which the City of Wilmington will manage development trends and plans.

2.7.1 Land-Use Changes

The FLUP sees Wilmington as a maturing and substantially built-out city, with three key trends:

- Transition of residential uses in developed areas – with single-family residential uses transitioning to either higher-density residential uses or commercial uses.
- Infill development of vacant land – both large and small parcels.
- Redevelopment of existing commercial properties – including expansion or renovation of existing buildings that are aging, under-utilized or substandard.

All three of these trends will affect city residents' lifestyles and hence their travel needs. In terms of affecting the WMTC site, however, the third trend is most relevant, because the site is within one of the areas identified as likely to redevelop. Although not described as such in the FLUP, discussion with city planners has indicated that this redevelopment area is expected to see a strong element of residential redevelopment with relatively high densities.

Figure 2.5 shows the site in this context. The site is within a Tier 2 Redevelopment Area and near a Tier 1 Redevelopment Area (the latter are also known as Priority Redevelopment Areas). It should be noted that the areas shown in the FLUP are defined only generally, and exact boundaries are intended to be somewhat flexible in response to changing economic conditions.

The City sees Tier 1 areas as the ones where it has the best chance to create positive change. It expects to make supporting and pursuing redevelopment a high priority in these areas. Tier 2 areas are targeted for upgrade on an opportunistic basis when the uses change. However, because they are still commercially viable or acceptable in their current state, they are not an immediate priority for actively pursuing redevelopment.

2.7.2 Transportation

The FLUP recognizes that the City cannot rely simply on building new roads. The goal is a multi-modal transportation system that reduces the need for new roadway construction. Strategies that refer to the proposed WMTC include:

Strategy 1.3.4

Encourage the reintroduction of passenger rail service into the region. This will be partially accomplished through the construction of the proposed multi-modal center.

Strategy 1.3.6

Construct a new transit transfer facility and implement Wave Transit route restructuring [...] as outlined in the *Short-Range Transit Plan*. Route restructuring will focus all service at two major nodes,

the new transfer facility near Market Street and Kerr Avenue and the future downtown multi-modal transportation center.

There is a specific objective to increase the use and effectiveness of alternate transportation modes, including transit. Proposed performance targets include:

- Rate of increase in vehicles miles traveled (VMT) on arterials - Reduce by 25% within the next ten years - This is consistent with statewide goals
- Public transit ridership increased by 50% in four years relative to fiscal year 2002 ridership - this will be accomplished by the addition of a new fleet, and major route restructuring
- Percentage of the pedestrian and bicycle mode split. Increase the pedestrian and bicycle mode split from the current 3% of all trips to 6% of all trips in ten years

The plan recognizes, however, that

Alternative modes of transportation such as pedestrian, bicycle, and public transit currently compose a small share of all regional travel. Realistic increases in the use of these modes will not drastically modify regional travel patterns as a whole, but would be expected to make a noticeable impact in selected areas of concentrated development for particular categories of trips.

Figure 2.5 **Redevelopment Areas (Extract from Future Land Use Plan Map)**



Source: Extracted from redevelopment map in Future Land Use Plan. Not to scale.

Key implications for the WMTC:

- The FLUP's goals and issues are relevant to the present study because it may be possible, as part of the "Transit Futures" discussion later in the study process, to estimate a level of transit service that might be appropriate to meet the FLUP's ten-year performance targets.

2.8 Northside Community Plan

The proposed WMTC is within the Northside community. This community consists of inner-city neighborhoods that have not realized the same economic growth that other areas of the city have experienced. At the 2000 Census, more than one-third of families in the Northside community lived in poverty. The area is also architecturally and historically significant for Wilmington because it depicts the character of a mid-nineteenth to early twentieth-century neighborhood that was home to factory, dock and railroad workers.

The community's neighborhood revitalization strategy, the Northside Community Plan, was adopted by the City of Wilmington in July 2003. Key aspirations within the plan include the establishment of a local grocery store and other new stores/businesses in keeping with the neighborhood's character, as well as a community resource facility (planned for the eastern part of the neighborhood) that would support recreation, education, vocation and rehabilitation activities. The strategy also envisaged a Northside Financial Counseling Center, possibly located within the community resource facility.

No location for the grocery store was agreed in the plan, although the U-Haul site was one of several possible locations. Action Step 1.11, which applied to both the grocery store and the other new stores/businesses desired, was to "Establish a multi-modal transportation hub in close proximity to the Northside to increase the means of transportation to and from the area."

Another objective was revitalization. One of the action steps for this is to "protect and preserve the historic brick streets in the Northside community." The plan also recommended streetscape enhancements on the commercial areas of North 3rd Street and Red Cross Street (the latter from North 3rd Street to McRae Street).

Enhanced transit service was another objective. The action steps for this included:

- "Provide a bus route to strategic shopping areas, specifically, the Monkey Junction area." [Transportation Action Step 2.4. Note that this was before the recent route restructuring. An indirect link between the neighborhood and Monkey Junction is now available, using the downtown trolley and route 201.]
- "Add the N. 4th Street area to the free trolley service route (specifically around the New Hanover Health Center)." [Transportation Action Step 2.6. The Health Center is at North 4th Street and Harnett Street, a few blocks north of the proposed WMTC. This has now been implemented, as shown in Figure 2.3.]

Key implications for the WMTC:

- The aspiration for increased transit service reinforces the possibility of densification of the route network within the existing urban area.
- Some of the community's aspirations, particularly the grocery store, could be realized in conjunction with the WMTC project. This would not substantially affect the

transit needs, but could affect the land assembly and possibilities of joint development.

- The desire to preserve the historic environment, including the brick streets, will represent a constraint on site layout.

2.9 Wilmington Vision 2020: A Waterfront Downtown

The downtown plan, *Wilmington Vision 2020: A Waterfront Downtown*, was adopted in December 2004. It aims to more fully connect downtown Wilmington and the Cape Fear River, to achieve the vision of a waterfront downtown that is an inviting mixed-use destination. The recommendations are organized around three central objectives: celebrating the waterfront, completing the historic core, and continuing recent progress. Its goals for 2020 included increasing the downtown population by 3,000 new residents, 1,500 new housing units, 10,000 new jobs, and 200% more hotel rooms.

The plan recognized the current division of downtown, “with the historic downtown core separated from the underutilized downtown north area [which includes the WMTC site] by Walnut Street.” However, it recognized a number of development opportunities. Some “parcels in the north waterfront area are currently used for industrial activities that are incompatible with the future vision of downtown and will not be the highest and best uses.” Similarly, the plan envisioned that Cape Fear Community College would eventually have a financial case for consolidating its parking lots into structures on fewer parcels.

Figure 2.7 is an extract from the downtown plan map, showing the area around the proposed WMTC. It should be noted that the area labeled ‘Intermodal Center’ on the downtown plan has been superseded by the currently proposed site, and that the new PPD, Inc. office building has superseded some of the plan’s details for the northern part of its area.

The plan’s recommendations for physical elements included one to “Convert rails-to-trails open space along the former railroad corridor without precluding a multi-modal facility.” It is not clear whether the plan envisaged railroad tracks coexisting with the trail; this issue would need to be addressed at a later stage.

Other proposals that are particularly relevant to the WMTC site included:

- Streetscape improvements on Hanover Street and Red Cross Street;
- An undefined public/civic use for the current gas station site at North 3rd Street and Hanover Street;
- Location of the proposed conference center on the waterfront, between Hanover Street and the Wilmington Railroad Museum; and
- Returning North Front Street to two-way traffic with new streetscape treatment.

Key implications for the WMTC:

- The specific proposals listed in the Downtown Plan would not substantially affect the transit needs, but could affect the site layout.

Figure 2.6 Downtown Plan Map: Inset



Source: Wilmington Vision 2020 (Downtown Plan). Proposed WMTC site added for clarity. Note that the area labeled 'Inter-modal Center' has been superseded by the currently proposed site.

2.10 Cape Fear Historic Byway Corridor Management Plan

The Cape Fear Historic Byway is North Carolina's first urban scenic byway. It runs in a figure-eight loop through downtown Wilmington and the neighborhoods to the north and south, broadly parallel to the Cape Fear River. The route includes North 3rd Street, on the western side of the proposed WMTC site; this part of the route is designated as the 'North 3rd Street Civic Corridor'.

A Byway Plan was adopted in May 2008. The plan's vision is that

[t]he Cape Fear Historic Byway carries visitors and residents through a scenic tour of the key landscapes that make up Wilmington's urban fabric [...] The byway can be explored by walking, biking, driving, and even taking a horse-drawn carriage or trolley to a multitude of attractions.

The plan's goals lay strong emphasis on preserving, and raising awareness of, the historical environment along the byway. Several specific goals are particularly relevant to this study:

Goal #1: Encourage visitors to get out of their cars and safely explore the corridor by alternative means of transportation such as on foot, bike, trolley, horse carriage and even boat.

Goal #11: Increase pedestrian and biking safety along the byway corridor, particularly on [North and South] 3rd Street.

Goal #12 : Preserve the existing brick streets and make recommendations for additional streets to be covered in brick.

Given its location on the byway and its role in bringing visitors into Wilmington, the WMTC should therefore consider a potential role serving horse carriages and other local circulation. Indeed, the Byway Plan acknowledges that the WMTC's location and function match well with its goal #1.

The Byway Plan draws attention to the role of not only Wave Transit's downtown trolley but also a number of private trolleys:

The current public and private Wilmington trolley services are an excellent way for visitors to get oriented to the byway and the rich heritage of the City. The WAVE trolley service offers visitors with free ridership on a circuit that engages the waterfront, downtown and north waterfront area [...] Private trolleys extend travel into the historic neighborhoods of the City. The City of Wilmington should work with private trolley operators to share with them the goals and objectives of the byway and the action plan elements for implementing the byway. Private operators can become valuable partners in the interpretation and visitation of the byway. Linking the public and private trolley operations should also be a goal of the City. Coordination can occur physically, such as sharing space and slot times at transfer stations, or be accomplished through brochures and internet sites that define schedules and attractions.

Extended trolley service should also be considered to include a trip to Greenfield Park and Gardens, even if only for limited service, such as twice daily or on weekends. This would allow for greater compatibility in cross-marketing the Cape Fear Historic Byway with trolley service.

The WMTC should therefore consider whether (and if so, how) it should act as a physical coordination point for these services.

In addition to issues relating to the streetscape of North 3rd Street, the recommendations for specific locations included the following that are particularly relevant to the WMTC:

- Spur paths leading visitors to the revitalized N. 4th Street are recommended with signs and maps directing visitors to the historic sites found adjacent to the byway corridor.
- The future Multimodal Transportation Center is to be located on the east side of N. 3rd Street, between Hanover and Campbell. The center should be built to the sidewalk (oriented towards the street) with a permeable façade; other than on-street parking, the parking area(s) should be allowed only above, below, behind, or beside the building, not in front of the building.
- Near the future Multimodal Transportation Center, the elevation of the road [N. 3rd Street] changes, originally to accommodate rail traffic beneath the road. Now that there is no longer rail traffic, the road may be made level once again, possibly in conjunction with the building of the Multi-modal Center. Byway funding should also be considered to return the road to its original elevation. A portion of the underpass should be preserved underneath the road for bicycle and pedestrian access.

Key implications for the WMTC:

- The specific proposals listed in the Byway Plan would not substantially affect the transit needs, but could affect the site layout.
- The Byway Plan and the Downtown Plan together suggest that there may be a role for the WMTC in welcoming visitors and acting as a hub for their specific transportation needs. This might include being a starting-point (not necessarily the only one) for carriage, trolley or walking tours. (There are parallels with the visitor center in Charleston, SC, which is not a conventional WMTC but provides the hub role for visitors.) This was explored further in liaison with stakeholders, as described in Section 4 of this report.

2.11 North 3rd Street Streetscape Project

A streetscape project for North 3rd Street is currently under design. In addition to an overall improvement in the street's quality, particularly for pedestrians, the street is likely to gain a median. This is currently expected to result in changed traffic movements near the WMTC site:

- At North 3rd Street and Hanover Street, there will be no access across the median, except for a northbound left-over from North 3rd Street to Hanover Street. That is, Hanover Street on the WMTC side of North 3rd Street will become right-in, right-out. Decorative crosswalks will be provided on all approaches.
- At North 3rd Street and Campbell Street, there will be no access across the median. Campbell Street will become right-in, right-out. Decorative crosswalks will be provided on all approaches. (The City is currently re-evaluating this proposal in the light of the recommended WMTC site layout.)

- At 3rd and Red Cross, traffic movements will be unchanged, although the intersection will be upgraded. Decorative crosswalks and signals will be provided on all approaches.

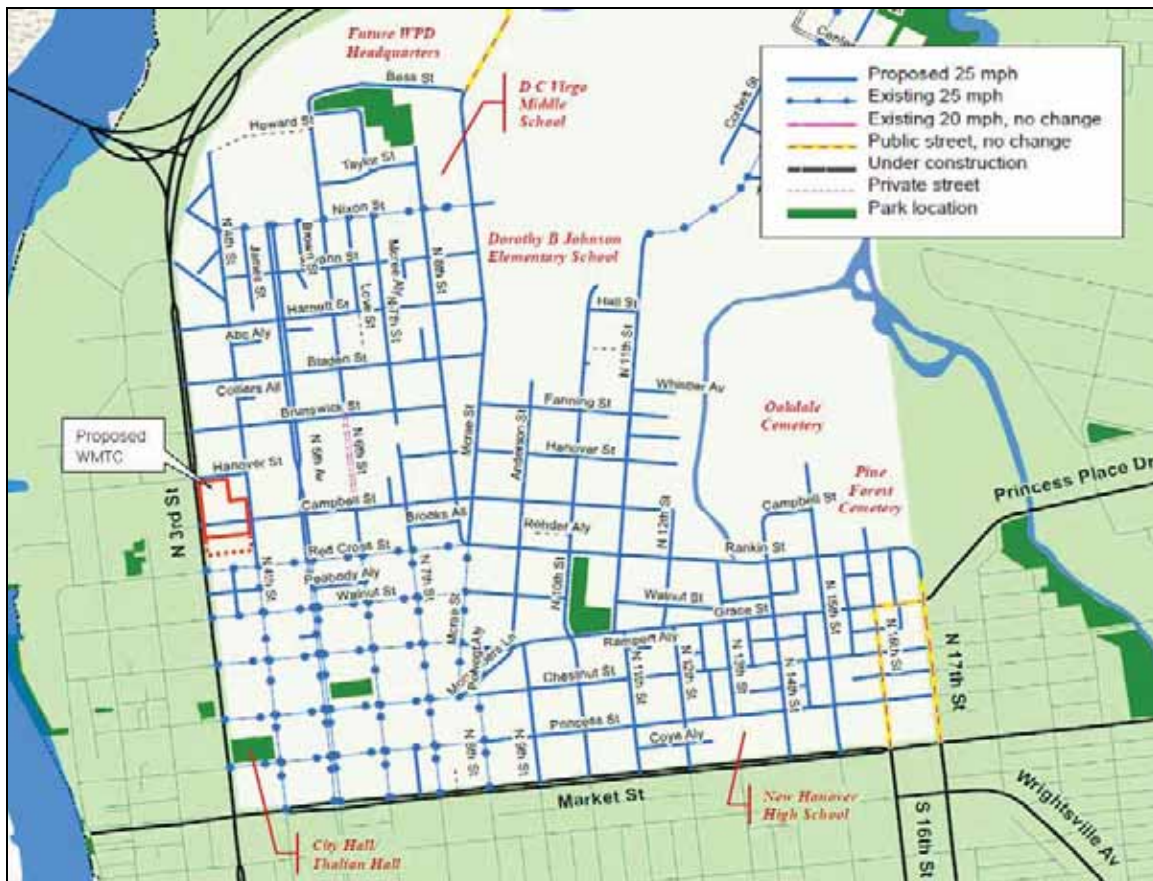
Key implications for the WMTC:

- The site layout will need to take account of the expected restrictions in vehicle movements to/from North 3rd Street.

2.12 Neighborhood Traffic Management Program

The City of Wilmington has a program of assessing traffic-calming options in its neighborhoods. The WMTC site lies within the Brooklyn / Carolina Heights / Hemmenway / Love Grove neighborhood for this purpose. The main element of the plan for this neighborhood that is relevant to the WMTC is that the existing 25 mph zone south of the WMTC has been extended northwards around the site (Figure 2.8). None of the proposed long-term improvements affect the WMTC site.

Figure 2.7 Neighborhood Traffic Management Program



Source: based on Neighborhood Traffic Management Program map, August 2006. Proposed WMTC added for clarity. The 'proposed 25mph' speed limits have now been implemented.

2.13 Cape Fear Community College Plans

Cape Fear Community College (CFCC) is one of North Carolina's largest community colleges. Its main campus is in downtown Wilmington, just west of the proposed WMTC, and it is therefore an important neighbor to the WMTC as well as a major generator of travel demand. It also has a North Campus in Castle Hayne and a satellite location in Pender County.

The college's *Long Range Plan 2007-2013* anticipates that enrollment will increase by 31% (in full-time equivalent terms) over that timescale. However, the plan considers this to be a conservative estimate, because growth in nearby areas of Brunswick County was not taken into account. The college's service area consists officially of New Hanover and Pender Counties, but 7% of its students are currently from Brunswick County. This reflects the recent development of nearby areas such as Leland, and the trend is expected to continue.

The college's *2007-2013 Facilities Master Plan* translates the capital needs identified in the Long Range Plan into a more definite physical form. The plan is conscious of the need to optimize the split of activities between the Wilmington and North Campuses. One factor behind this is the desire to minimize the number of faculty, staff and students traveling between the two campuses (leading to lost time, expense and duplicated parking needs). This is one of the reasons behind some of the locational decisions for major new buildings on the Wilmington campus.

Table 2.6 lists the Master Plan goals for the Wilmington campus. Figure 2.9 shows the physical plan for the campus. Among the extensive building proposals are two new buildings (Physical Education & Health, and Life Sciences) along North 3rd Street. The former railroad alignment will become a pedestrian and vehicle access route through the campus.

Key implications for the WMTC:

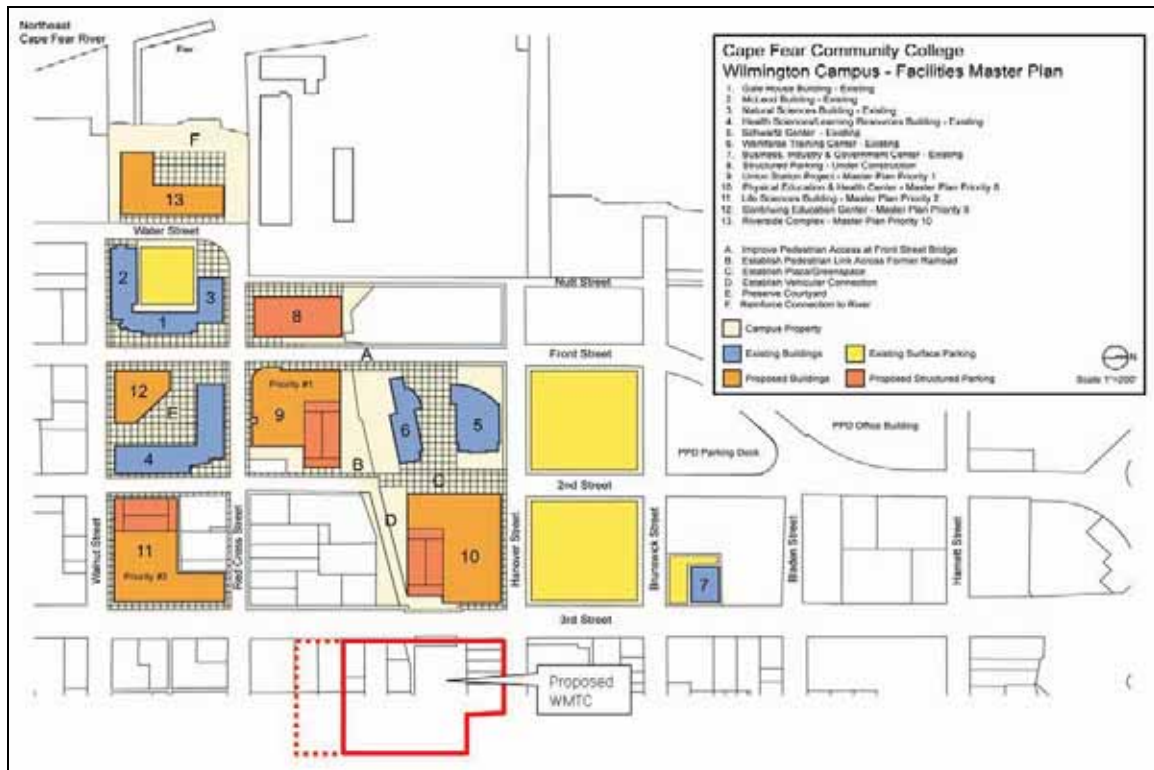
- CFCC's forecast growth may lead to increased demand for transit to/from the campus – not just from the existing urbanized areas but also from Brunswick County. This would most likely be met within the future Wave Transit route structure, and the WMTC would be a natural hub for these services.
- Although CFCC has rightly tried to minimize the amount of travel that will be needed between the Wilmington Campus and North Campus, there may nevertheless be a need for improved transit connections between the two in the future. This might be provided through a dedicated shuttle, or through the ordinary Wave Transit route structure (route 207 currently provides this connection).
- The west side of North 3rd Street will likely have an increasing number of institutional-scale CFCC buildings which will likely contrast with the more historically-oriented scale east of North 3rd Street. This contrast will ultimately present a challenge for site design.

Table 2.6 CFCC Wilmington Campus – Master Plan Goals

- **Reduce pedestrian and vehicular conflicts:** Continue established pattern of centralizing buildings and decentralizing parking where possible.
- **Preserve land:** Encourage multiple-level structured parking.
- **Reinforce connection to Cape Fear Community College and Riverwalk:** Develop property along river including pedestrian improvements adjacent to Riverwalk.
- **Improve Pedestrian Access:** Provide widened pedestrian access at Front Street Bridge and create pedestrian connection at Second Street across former railroad right-of-way.
- **Preserve and Improve Campus Identity:** Preserve student courtyard between Administration and Health Services/Learning Resources Building and plan the pedestrian connection along Second Street as another significant outdoor space incorporating landscaping, hardscapes, and site furniture.
- **Remain flexible:** Preserve the two blocks between Hanover and Brunswick Streets for future use (as yet to be determined).

Source: CFCC 2007-2013 Facilities Master Plan

Figure 2.8 CFCC Wilmington Campus – Facilities Master Plan



Source: CFCC 2007-2013 Facilities Master Plan. Proposed WMTC added for clarity.

2.14 Downtown Parking Plan and CBD Parking Strategic Plan

The most recent Downtown Parking Plan⁶ was published in 1999. Most of the plan's recommendations have now been implemented, including the Market Street deck and the County deck between North 2nd Street and North 3rd Street. The remaining recommendations are no longer expected to be implemented, due to changed circumstances or additional discussions with stakeholders since the plan was created. No major changes from today's situation are therefore expected due to the plan.

The City of Wilmington is planning to conduct a study leading to a new plan (the *Central Business District Parking Strategic Plan*). There will be an emphasis on the rapidly-redeveloping northern Downtown area. The aim will be to provide strategies and recommendations for funding and development of parking management programs, including leveraging private development. The plan is currently due to be completed in mid-2009.

Key implications for the WMTC:

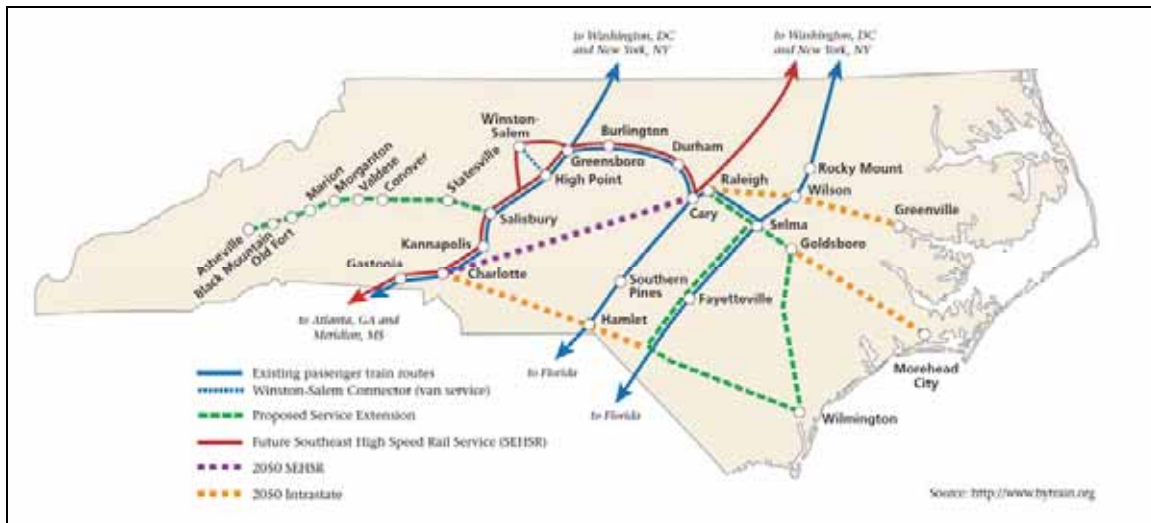
- It may be possible for the WMTC site to contribute to any wider parking needs of the northern Downtown area. In particular, use of 'air rights' over the WMTC site for a parking structure is a possibility.
- Conversely, an adjoining development may be able to provide parking to serve the WMTC's needs as a joint-venture. This would in turn reduce the land needed for the WMTC site itself.

⁶ *City of Wilmington, North Carolina Downtown Parking Facilities Plan – Final Report, January 1999.* Rich and Associates, Inc.

2.15 Passenger Rail Studies and Policy

NCDOT has been taking the lead in developing plans for existing and future passenger rail services within the state. Providing service to Wilmington is a key goal in the statewide rail plan (Figure 2.10).

Figure 2.9 Existing, Planned and Anticipated Passenger Rail Services



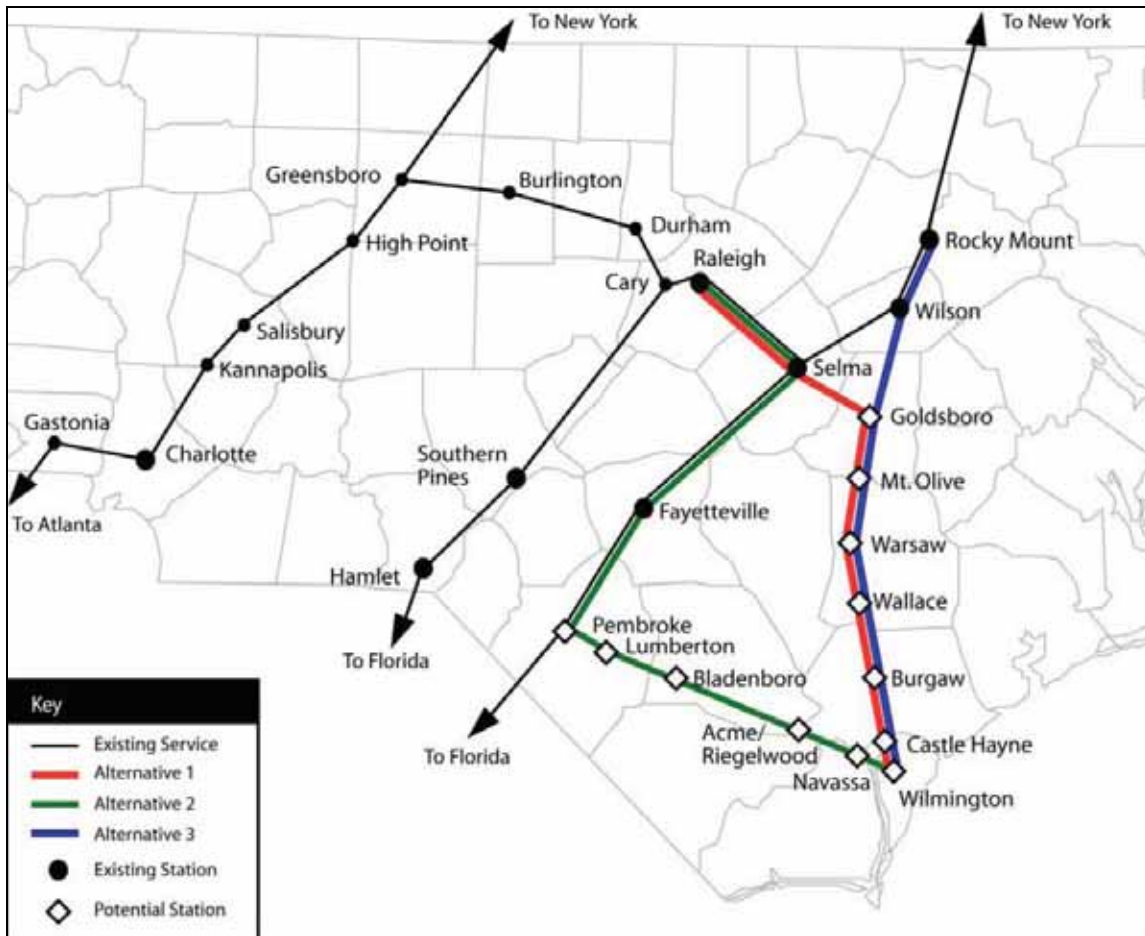
Source: NCDOT 2009 Rail Plan Executive Summary

In May 2001, NCDOT announced the results of the *Southeastern North Carolina Passenger Rail Feasibility Study*. This study examined three potential passenger train routes between Charlotte or Raleigh and Wilmington. The results showed strong interest in service between Wilmington and the northeastern States, and between Wilmington and Raleigh. The shortlisted routes were Wilmington to Raleigh via Fayetteville or Goldsboro, with potential connections to northeast cities. The Wilmington to Charlotte route was dropped from further analysis, due to low interest and low ridership projections.

The next step was to define the preferred options in more detail. This was done in the *Southeastern North Carolina Passenger Rail Study* (a slightly different title from the previous study), which reported in 2005. Figure 2.11 shows the routes evaluated in that study, which looked at the condition of former stations, environmental issues, track conditions, capacity limitations, journey times and potential capital costs.

The study concluded that a Raleigh to Wilmington route offered the most potential. Both of the route options (via Goldsboro and Fayetteville) held promise, but the availability of public funding would determine when and what service was implemented. The Wilmington-Rocky Mount route had the lowest ridership projections and was recommended to be dropped from further analysis. Appendix 6 reproduces the study's recommendations in full.

Figure 2.10 Routes Evaluated in the 2005 Southeastern NC Passenger Rail Study



Source: Southeastern North Carolina Passenger Rail Study

In a separate exercise, the *National Surface Transportation Policy and Revenue Study Commission* appointed a Passenger Rail Working Group to look at passenger rail issues. The Working Group's report⁷ has no official status as a 'plan', and emphasizes that it represents a vision rather than a specification of exact future routes. However, it does represent the best available picture of the potential level of inter-city passenger rail over the next few decades, assuming a future transportation policy that promotes passenger rail connections between major population centers, much like the Interstate Highway System has done in past decades. The report's 'vision' maps include corridor service between Wilmington and Raleigh (via both Goldsboro and Fayetteville) by 2030, and additional corridor service between Wilmington and Charlotte by 2050. These services would in turn connect to enhanced services on existing corridors and on other new corridors. Although (as the report comments) this is simply a vision rather than a firm specification, it corroborates the view that planning for passenger rail in Wilmington is realistic in the broad national context, and

⁷ *Vision for the Future: U.S. Intercity Passenger Rail Network Through 2050*. Passenger Rail Working Group of the National Surface Transportation Policy and Revenue Study Commission, December 2007

that there could easily be more than one rail service operating from Wilmington within the lifetime of the WMTC.

Since that Working Group issued its report, the national-level policy context for inter-city passenger rail has continued to improve, with recent developments including new funding streams.

Although attention to Wilmington has so far been focused on inter-city rail service, the major metropolitan areas of the state are developing commuter rail service proposals, and it is possible that Wilmington may also ultimately see commuter service. This study therefore considers possible commuter service in addition to inter-city service.

Key implications for the WMTC:

- Providing passenger rail service to Wilmington remains a key goal in the statewide rail plan.
- National-level debate and policy has recently become more favorable to inter-city rail. This corroborates the view that planning for passenger rail at Wilmington is realistic, and that there could easily be more than one rail service operating from Wilmington within the lifetime of the WMTC.

3 Local Transit Growth Scenarios ('Transit Futures')

3.1 Introduction

This section of the report assesses how local transit service in the Wilmington metropolitan area might grow during the lifetime of the WMTC. This is a key input for deciding the number of bus bays and amount of building space that should be provided for Wave Transit services.

Looking into the future like this is important, because experience at other transit centers in North Carolina and around the nation has consistently shown that a specification in line with today's needs, or even with the needs identified in short-range plans, will lead to an undersized design. It is usually better and more cost-effective to plan ahead, particularly in an area that is rapidly redeveloping and where expansion opportunities may close off in the future. Space can be reserved for future needs, even if it is not fully constructed at the outset.

3.2 Issues

Transit service growth is realistic: As described in Section 2, it is reasonable to expect transit service in the Wilmington metropolitan area to grow within the lifetime of the WMTC (say, 30 years from today). There is a long-term growth trend in both population and employment. Within Wilmington itself, current planning policies recognize transit's importance to the city (not just to the traditionally transit-dependent populations), and include goals to increase the use and effectiveness of transit.

Impact of WMTC itself: Increased transit service and/or increased ridership are often associated with the opening of a multi-modal center. The relationship is complex, and often mutually reinforcing. Sometimes a multi-modal center and transit expansion are implemented together in an expansionary period. In other cases, a multi-modal center improves the quality and visibility of an otherwise unchanged transit service, leading to increased ridership and boosting stakeholders' interest in transit expansion. There is no simple cause-effect rule. For these reasons, the potential growth of local transit will not be assessed in terms of the impact of the WMTC *itself*.

Future importance of downtown: Wilmington's geography is unusual, as downtown is not at the physical center of the urban area. This is why the current route structure has been developed around the 'Central Station', away from downtown. However, the route structure also retains downtown as a subsidiary transfer point, and (as described in Section 2 above) riders continue to make transfers there in some numbers. Moreover, as the region develops and grows, downtown Wilmington is likely to increase in importance, relative to the area around Central Station. This is because:

- Planning policies and development trends are pointing to major employment growth in the north downtown area. The recent construction of the PPD, Inc. global headquarters in this area is an important example.
- Areas east of downtown Wilmington are largely built-out. Areas north and west are less built-out and (as described in Section 2) are likely to see the bulk of suburban

expansion over the next few decades. This will re-center the region so that downtown is at the physical center.

Given the combination of these two factors, it is reasonable to assume that as the metro area grows, expansion of transit service into the newly urbanized areas will be focused on downtown, rather than Central Station, as the main destination.

3.3 Analysis

Table 3.2 lists a range of scenarios for potential transit service growth in downtown. The following text explains the scenarios and how they led to the final ‘target’ number of bus bays. For this analysis, the figures for the number of routes and bus bays refer to Wave Transit buses on fixed-route services. Downtown trolleys, paratransit vans, Greyhound and other services are not part of this analysis, although they are part of the full specification given in Section 4.

The scenarios are grouped into three categories:

- Those which simply take account of known factors, particularly short-term service aspirations.
- Those which apply a percentage growth rate to the current number of routes.
- Those which ‘guestimate’ where routes might realistically be added in the future.

3.3.1 Known Factors

At the time these scenarios were prepared, six routes served downtown and five of the six routes pulsed together. If the WMTC had opened at that time, with those routes, five bus bays would therefore have been needed for Wave Transit. This represented the baseline from which the scenarios were developed. Subsequently, there have been minor revisions to the schedule, and as a result only four of the six routes are now scheduled to pulse together downtown. However, it is still reasonable to treat five bays as the baseline, since further adjustments to the schedule are always possible, and the extra bay also acts as insurance against a late-running off-pulse bus occupying a bay that is needed during the pulse.

The previous WMTC studies, in 2000 and 2004, specified seven bays for Wave Transit (see Appendix 1 and Appendix 4). This would allow a degree of expansion from today’s service level.

Wave Transit has short-term aspirations for two new routes serving downtown. As described in Section 2, the current service pattern downtown broadly achieves what was envisioned in the WAVE Short Range Transit Plan, except for the Airport Shuttle route which is currently not funded. In addition, as a result of public input on the recent route restructuring, Wave Transit now also aspires to a new route (*205 Long Leaf Park*) between downtown and New Hanover Regional Medical Center. These two short-term aspirations, in addition to the existing service, constitute **Scenario 1** in Table 3.2. Assuming the two new routes joined the existing pulse downtown, Wave Transit would need seven bus bays.

However, Scenario 1 effectively allows for only a few years' growth in transit service, and is not sufficient for the lifetime of the WMTC. Scenario 1 is therefore seen as the 'base case' from which long-term growth can be projected.

3.3.2 Scenarios Based on Growth Rates

The next set of scenarios assume that transit service expands in proportion to the metropolitan area's growth. For the purpose of these scenarios, it is assumed that the growth consists entirely of new routes. In reality, it would likely be a combination of new routes and improved headways, so these scenarios represent a 'worst-case' situation (that is, the highest demand for bus bays).

In **Scenario 2**, transit service grows in line with the forecast 39% growth in the City of Wilmington's population by 2035. This growth rate, applied to the base case of seven bays, would require ten bays.

In **Scenario 3**, transit service grows in line with the forecast 75% growth in the Wilmington MPO area's population by 2035. This growth rate, applied to the base case of seven bays, would require 12 bays.

However, transit service would not necessarily grow directly in line with population growth. It might grow faster than population growth, because:

- Larger urban areas tend to have higher levels of transit per person than smaller ones. In Wilmington's case, the anticipated redevelopment of some city neighborhoods at higher densities would also probably lead to a higher intensity of transit ridership.
- National and global changes in energy costs, infrastructure funding or other transportation policies may lead to some (perhaps many) urban car trips switching to transit.

Alternatively, transit service might lag behind population growth. If growth is dominated by suburban-style subdivisions and dispersed edge-of-city employment centers, this would diminish the opportunities for effective transit service and ridership, compared to older, denser neighborhoods and concentrated employment areas.

Table 3.1 aims to show how much more transit-intensive Wilmington might become as it grows. In terms of both buses operated per capita and hours of transit service per capita, Wilmington is already one of the most transit-intensive cities in North Carolina. It compares favorably to larger cities with well-established transit systems. The only two cities that are more transit-intensive are Chapel Hill (which is a special case and not a fair comparison) and Charlotte. Person-for-person, Charlotte operates 52% more vehicles and 28% more hours of service (say, 40% on average).

In **Scenario 4**, transit service grows in line with the forecast 75% growth in the Wilmington MPO area's population by 2035 (as in Scenario 3), and then grows by 40% to represent an increase in transit intensity to a level comparable with Charlotte. In this scenario, Wave Transit would need 17 bus bays. As described above, all of these scenarios have assumed that growth is met entirely with new routes that all meet in downtown together; this is a worst-case situation.

3.3.3 Scenarios Based on Hypothetical Future Routes

As the urbanized area expands and downtown Wilmington employment draws people from the urban area and beyond, Wave Transit's service area will likely expand too. **Scenario 5** reflects this trend. Figure 3.1 shows the routes that might be implemented as a result. The routes are:

- Four 'commuter express' routes between downtown and:
 - Southport,
 - Bolivia and beyond,
 - Burgaw, and
 - Hampstead and Jacksonville (an inter-city service on this corridor is currently being considered by Wilmington MPO as a possible medium-term aspiration).
 - These commuter express routes would be similar in concept to those already operating in Charlotte and other large urban areas.
- Two new all-day routes, one between downtown and Leland/Northwest and another between downtown and Carolina Beach/Kure Beach. The existing routes on these corridors (203 *Brunswick Connector* and 201 *Monkey Junction*) would be retained with a simplified routing to concentrate on local neighborhoods in Leland and Wilmington respectively.
- Two new intensive all-day routes on busy corridors: Market Street (toward the County line) and Oleander Drive (toward Wrightsville Beach). These could be bus rapid transit (BRT) corridors or simply a conventional but intensive service.

It should be emphasized that these routes have been generated for the purposes of this study and (except where stated) do not represent any actual plans. Scenario 5 adds these eight routes to the base case of seven bays, for a total of 15 bays if all the new routes were in downtown on-pulse.

At the same time as downtown's catchment area expands, transit service may become more intensive within the existing service area. **Scenario 6** looks at this. It assumes that the current transit corridors remain, and that more intensive service is provided by converting the existing loops to two-way service on the same corridors:

- 105 *Medical Center* splits into a route via Front Street and another via Market Street.
- 202 *Independence* splits into a route along South 5th Avenue/Dawson Street/South 17th Street, and another along South Front Street/Castle Street/Wrightsville Avenue.
- 207 *Castle Hayne* splits into a route serving Castle Hayne Road and another serving Kerr Avenue and College Road.

Another way of looking at this is to assume that new service is added on existing loops but in the opposite direction; the result is the same for the purposes of this study. This scenario adds three routes to the base case of seven bays, for a total of ten bays if all the new routes were in downtown on-pulse.

Scenario 7 combines the two previous scenarios: the wider service area and the more intensive service within Wilmington. This would lead to a total requirement for 18 bus bays (seven in base case, plus eight regional routes, plus three new local routes) if all the new routes were in downtown on-pulse.

Scenario 8 takes scenario 7 and adds two potential new shuttles aimed at serving educational needs:

- A route connecting the downtown and north campuses of Cape Fear Community College.
- A route connecting downtown with the University of North Carolina – Wilmington. Currently there is no direct service between the two during the daytime.

Although neither of these services reflect any plans by the institutions, they are in line with services provided in many ‘college towns’ across the nation. This scenario would lead to a total requirement for 20 bus bays if all the new routes were in downtown on-pulse.

All the scenarios so far have assumed that new routes would require their own new bus bays. This will not necessarily be true, and the final scenarios address this. **Scenario 9** assumes that some of the new routes will go ‘off-pulse’ – that is, they will be timed to arrive in downtown outside the pulse period. This is common in cities with intensive services or with a mixture of local and regional services. In this scenario, the local all-day routes pulse together (for fastest transfers on shorter trips), and the two educational shuttles, four commuter expresses and the Carolina Beach / Kure Beach route arrive off-pulse (possibly in a separate pulse of their own). This is realistic because riders in the latter group are more likely to be traveling to/from downtown and less likely to require transfers to/from local routes. This scenario reduces the number of bays required to 13.

Finally, **Scenario 10** takes a different approach. It assumes that one bay would be needed for, and dedicated to, each of the main corridors out of downtown Wilmington. Routes along a corridor would be spaced out in time, to give a good spread of departure times. This is a relatively common approach, as it is convenient for people who have a choice of routes to their destination. Depending on what is considered to be a corridor, there are approximately 13 corridors out of downtown, and hence 13 bays would be provided. This is the same figure as in Scenario 9.

3.3.4 Reality-Check Against Comparable Cities

The scenarios suggest that 13 bays is a realistic ‘best guess’ for the number of bays that might be required in the long term. As a reality-check, this can be compared to other cities’ transit centers. Table 3.3 provides this comparison, and more details of the peer cities are provided in Appendix 7. The four peer cities have centers with 16-18 bays, and sometimes additional on-street bus stops. In two cases, the local transit service has been split into opposing pulses that can be accommodated in the centers. In the other two cases, the centers are effectively full with the current pulses and a split into opposing pulses will likely be needed to accommodate future growth.

3.4 Conclusion

In the light of this analysis, the Steering Committee agreed to a target of 15 bus bays for Wave Transit. The scenarios suggest that 13 bays is a realistic ‘best guess’ for the number that will be needed. The agreed target of 15 bays represents 13 plus another two as a ‘safety factor’.

This figure is for city buses only. Additional space will be required for trolleys, vans, Greyhound and other users; these are addressed in Section 4.

Ideally, all buses should be accommodated off-street, within the WMTC site. However, site factors may make this difficult in some cases, and the Steering Committee accepted that at peak times some buses could be accommodated at adjoining street curbs if necessary. This would be particularly reasonable for buses that run past the WMTC rather than starting or finishing a run there.

Table 3.1 Peer-Comparison of Fixed-Route Transit Services in North Carolina

	City	Agency	2007 City Population	FY 06 (NTD 2006 datasets)		FY06 derived data		Notes		
				FY06 Vehicle revenue miles	FY06 Annual unlinked trips	FY06 Revenue hours	FY06 VOMS		FY06 VOMS per thousand capita (city population)	FY06 Revenue hours per capita (city population)
Smallest ↑ ↓ largest	Jacksonville	Jacksonville Transit	77,301	56,798	11,575	4,114	1	13	0.053	
	Henderson County	Apple Country Transit	12,747	86,307	64,562	6,456	2	157	0.506	Population shown is for Hendersonville
	Salisbury	Salisbury Transit	31,023	137,883	138,633	9,557	3	97	0.308	
	Wilson	Wilson Transit System	49,947	190,655	163,640	12,629	4	80	0.253	
	Greenville	GREAT	76,222	203,998	226,010	14,251	4	52	0.187	
	Goldsboro	Gateway	37,341	196,466	209,358	15,983	4	107	0.428	
	Cary	C-Tran	132,443	160,990	23,354	9,946	5	38	0.075	FY06 was first year of fixed-route service
	Hickory	PTWS	40,520	217,170	144,228	20,738	5	123	0.512	
	Rocky Mount	Tar River Transit	56,288	307,287	308,953	18,322	6	107	0.326	
	Gastonia	Gastonia Transit	72,779	300,871	282,569	21,147	6	82	0.291	
	Concord/Kannapolis	Rider	113,873	446,131	303,100	25,262	6	53	0.222	FY06 was second full year of fixed-route service
	High Point	Hi-Tran	98,791	406,313	722,476	29,644	11	111	0.300	
	Fayetteville	FAST	181,453	704,522	1,380,910	46,815	16	88	0.258	
	Asheville	ATS	76,764	840,690	1,149,337	58,223	16	208	0.758	
	Wilmington	Wave Transit	100,746	1,198,753	1,411,221	88,991	25	248	0.883	
	Greensboro	GTA	248,111	1,337,904	3,030,016	106,656	25	101	0.430	
	Winston-Salem	WSTA	224,889	1,433,380	2,861,769	119,564	34	151	0.532	
	Durham	DATA	222,472	2,277,228	4,448,972	166,272	37	166	0.747	
	Raleigh	CAT	367,098	2,116,629	3,937,310	165,178	48	131	0.450	FY06 saw some DR connector service moved to fixed-route
	Chapel Hill	CHT	54,904	1,817,888	5,874,247	145,333	61	1,111	2.647	
Charlotte	CATS	674,658	10,370,824	20,202,584	764,686	255	378	1.133		
	Total	2,860,322	24,808,687	46,894,824	1,849,767	574	201	0.647		

Difference between Wilmington and Charlotte 52% 28%

VOMS = Vehicles Operated in Maximum Service
 These data are for fixed-route service ('bus' in National Transit Database) only.
 Agencies are listed from smallest to largest, based on VOMS and revenue-hours.

Sources:
 2007 City Population: NC Office of State Budget and Management, State Demographics Branch website. Concord and Kannapolis are combined.
 The City population will not necessarily correspond exactly to the service area population, but is reasonable approximation for the purposes of this table.
 FY 06 NTD transit statistics: NDCOT Summary of agency stats
 FY 07 NTD transit statistics: NTD agency profiles

Table 3.2 ‘What If...?’ Transit Growth Scenarios

	Scenario	Description	Number of Routes	Wave Transit bus bays needed*	Notes
Known factors	-	Existing	6	5	
	-	Specification in 2000 and 2004 studies	n/a	7	Plus 3 trolley/van bays
	1	Existing + new Airport route + new Medical Center route Airport route is an unfunded SRTP aspiration. Medical Center route is a recent aspiration arising from the 2008 route restructuring. Assume these add to the downtown pulse (2 new bays).	8	7	Treat this as 'base case'
Scenarios based on growth rates	2	Existing + airport/med routes + straight-line growth Reflecting 39% city population growth forecast by 2035.	11	10	
	3	Existing + airport/med routes + straight-line growth Reflecting 75% MPO area population growth forecast by 2035.	13	12	
	4	Scenario 3 + increased density of transit Additional 40% transit growth, representing 'transit density' similar to Charlotte (see separate table).	18	17	= Baseline x 175% x 140%
Scenarios based on hypothetical future routes	5	Existing + airport/med routes + new regional routes Eight hypothetical new routes (8 new bays)	16	15	See notes below
	6	Existing + airport/med routes + denser service within Wilmington Splits existing loops into separate routes (3 new bays)	11	10	See notes below
	7	Combination of scenarios 5 and 6	19	18	
	8	Scenario 7 + new educational shuttles Downtown to UNCW and CFCC North Campus (2 bays)	21	20	
	9	Scenario 8 + some routes go off-pulse Educational shuttles, Carolina Beach/Kure Beach route and commuter expresses arrive off-pulse (saves 7 bays)	21	13	
	10	One bay for each corridor out of downtown Assumes routes that share a corridor will be spaced apart in time (for best service) and can therefore share a bay.	13 or more	13	See notes below

Notes

* Excluding downtown trolley, paratransit vans, Greyhound.

Except where otherwise specified, all scenarios assume growth is met by additional routes which join the downtown pulse and therefore require additional bays. This is a 'worst-case' scenario.

Scenario 5 - new regional routes:

Southport commuter express
 Bolivia commuter express
 Burgaw commuter express
 Jacksonville commuter express
 BRT or 'frequent service' route along Market St & into Pender County
 BRT or 'frequent service' route along Oleander Drive to Wrightsville Beach
 Brunswick Connector splits into Northwest route and Leland local route
 Carolina Beach / Kure Beach route (existing Monkey Junction route concentrates on local role)

Scenario 6 - densification within Wilmington

101 Brooklyn / Princess Pl - no change
 105 Medical Center - splits into two routes
 201 Monkey Junction - no change
 202 Independence - splits into two routes
 207 Castle Hayne - splits into two routes

Scenario 10 - corridors:

Castle Hayne Road
 Northside Neighborhood
 Princess Place Drive
 Market Street
 Wrightsville Avenue
 Oleander Drive
 South 17th Street
 Carolina Beach Road
 River Road (Wilmington - east of river)
 River Road (Brunswick County - west of river)
 US-17 Ocean Highway
 US-74/76 Andrew Jackson Highway
 US-421

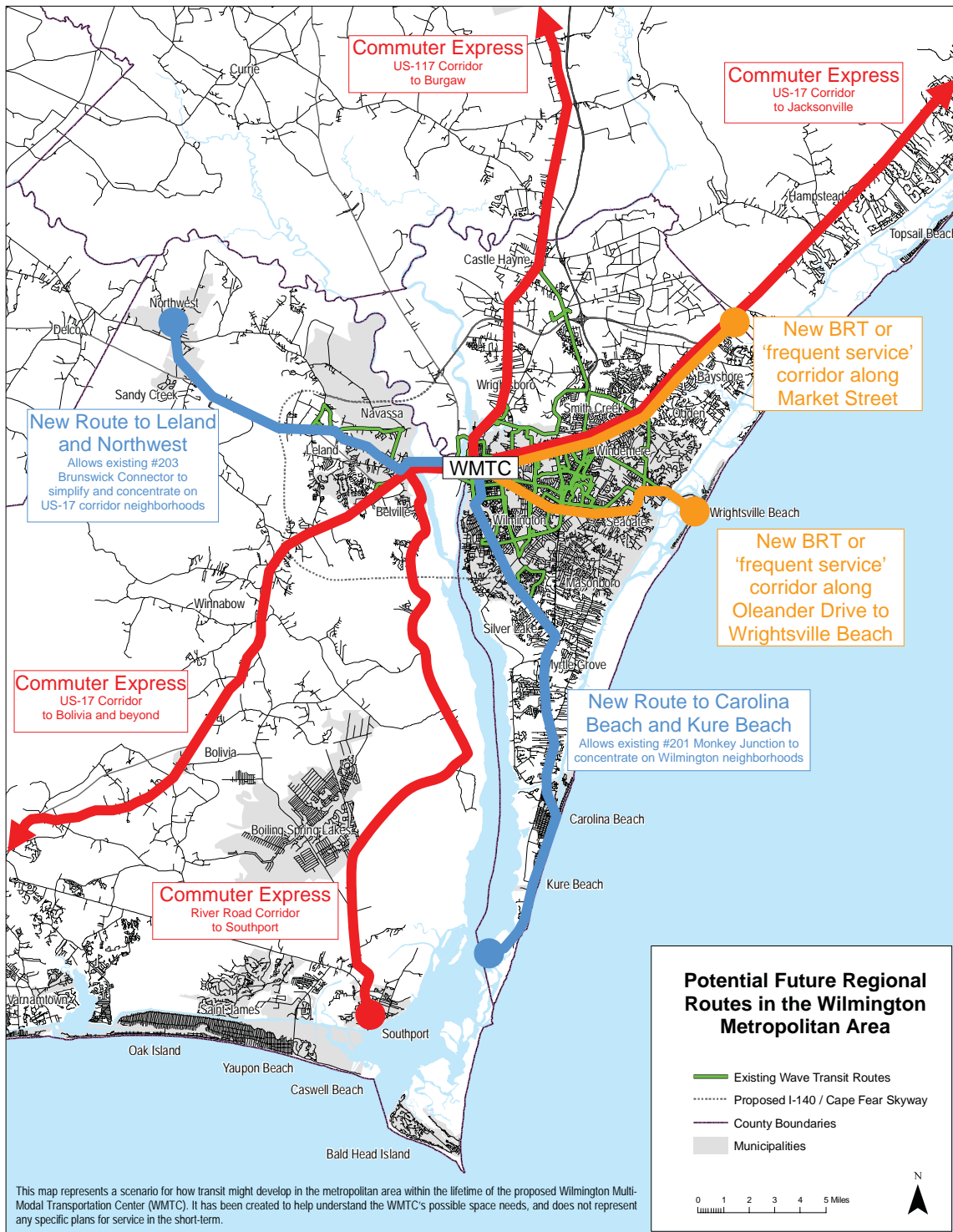
Table 3.3 Reality-Check of WMTC Specification Against Comparable Cities

City	City Population (note 1)	Routes serving downtown (note 2)	Local bus bays in transit center	Current maximum pulse	All services pulse together?
Durham	222,472	18 (14 DATA, 4 Triangle Transit) (note 3)	Existing: 13 + streets New: 16	15 (13 in center, 2 on-street)	Yes. Existing center is full. New center will allow some growth.
Winston-Salem	224,889	26 (19 WSTA, 7 PART)	16 + streets	12 (10 in center, 2 on-street)	No.
Greensboro	248,111	23 (14 GTA, 5 HEAT, 4 PART)	18	18 (all in center)	Yes. Existing center is full.
Raleigh	367,098	25 (19 CAT, 6 Triangle Transit)	16 + streets	13 (12 in center, 1 on-street)	No.
Wilmington	100,746 (MPO area 209,000)	6 (note 4)	Street only	5	Mostly. Main pulse is at Central Station but schedule allows a 'bonus' pulse at downtown).
Wilmington 2035 ?	137,000 (MPO area 366,000)	20 (note 4)	Target of 15	13 (best estimate)	Probably not.

Notes:

- (1) Actual service area population may differ, particularly in Wilmington.
- (2) Based on Monday-Friday morning peak schedule.
- (3) DATA 12/12B and 16/16B are counted as two routes rather than four. Similarly, Triangle Transit 402/403 and 412/413 are counted as two routes rather than four.
- (4) Excludes trolley(s).

Figure 3.1 Potential Future Regional Transit Routes



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4 Stakeholders' Views and Aspirations

4.1 Introduction

This section describes the views and aspirations of the main transportation service providers that are expected to use the WMTC, as well as the views of other stakeholders who were contacted as part of the study.

Table 4.1 summarizes the stakeholders contacted for this study. The responses are described below. Detailed functional requirements or space needs are not necessarily described here, but are listed in Section 5.

Table 4.1 Stakeholders Contacted

Organization	Comments / requirements listed below?
Service Providers	
Wave Transit	Yes. Also Steering Committee member
Greyhound	Yes
NCDOT Rail Division	Yes. Also Steering Committee member
Brunswick Transit System, Inc.	Yes (no requirements at this stage)
Pender Adult Services, Inc.	Yes
Columbus County Transportation	Yes (no requirements at this stage)
Elderhaus	Yes
Registered taxi operators in City of Wilmington	Yes (several operators)
Tour trolleys, carriage rides, pedicabs, walking tours in City of Wilmington	Yes (one operator)
Other Downtown Stakeholders	
NCDOT Public Transportation Division	Steering Committee member
City of Wilmington - Transportation Planning and Wilmington Metropolitan Planning Organization (WMPO)	Steering Committee member
City of Wilmington - Parking Manager	Yes
City of Wilmington - Historic Preservation Planner	Yes
Greater Wilmington Chamber of Commerce	Yes
Wilmington / Cape Fear Cost Convention and Visitors Bureau	Yes
Cape Fear Community College	Yes
Downtown Business Alliance	
Historic Wilmington Foundation	Yes
Wilmington Downtown, Inc.	
WMPO BikePed Committee	Yes (several members)
Major downtown employers	PPD responded and has no comments at this stage.

4.2 Wave Transit

Wave Transit would like to use the bus-related elements of the WMTC as soon as possible. The current on-street transfer location on North 2nd Street at Princess Street is unsatisfactory, because it has very limited space and no facilities other than shelters. As discussed in Section 3 of this report, there is great potential for Wave Transit to expand service in and around the Wilmington urban area.

4.3 Human Service Transportation Providers

Pender Adult Services (PAS) offers human-service transportation, employment-related transportation (which has started recently), and rural general public (RGP) transportation. Around 90% of client needs involve trips to Wilmington. Pender is a large rural county, which means trip origins are dispersed and the trips are expensive to operate (for example, the county seat of Burgaw is more than 20 miles from downtown Wilmington). RGP funding is minimal, so RGP trips are only offered within Pender County.

PAS contracts with Wave Transit for transportation for clients who need to go to hospitals in the Raleigh-Durham area. PAS brings clients to the PAS offices in Burgaw, where they are met by a Wave Transit van en route from Wilmington to the Raleigh-Durham area. This arrangement has recently started and appears to work well.

PAS would be in favor of fixed-route service along any or all of the three main corridors through the county (US-17 through Hampstead, US-117 through Burgaw and US-421 through Wards Corner). This would help PAS serve its clients more cost-effectively. For example, with a Burgaw route, PAS clients could receive a ride to Burgaw, then transfer to a bus to Wilmington and onward connections. Although trips to Wilmington's medical district might require a further transfer, this would still be better than running a County van all the way to the medical district.

The 'commuter express' services along US-117 to Burgaw and along US-17 that are currently assumed for the WMTC's site requirements would fit this model well. US-421 is currently very rural, but some new subdivisions are planned along this highway in the southern part of the county, so there may be scope for a US-421 route too.

PAS would drop-off/pick-up clients to/from trains and Greyhound at the WMTC, as required, but does not foresee any need for van-to-van transfers there.

Elderhaus is an adult day care program that includes transportation as one of its services. It operates its own transportation service, which is unusual in Wilmington as most human service agencies in the area use Wave Transit. Elderhaus clients all have either physical or mental disabilities and most have some form of dementia. It uses Wave Transit for about one-third of its clients, but uses its own transportation for the remainder, who require an aide to assist the driver. Elderhaus does not expect that its vehicles would need to use the center regularly.

Brunswick Transit System and **Columbus County Transportation** both commented that they have no specific requirements for the center.

4.4 Inter-City Transit (Greyhound)

At the time of the previous (2004) study, the inter-city bus operator was Carolina Trailways, a subsidiary of Greyhound Lines, Inc. Since then, Carolina Trailways has been integrated within the parent company and operates under the Greyhound brand. However, the broad policy on terminals remains the same. Greyhound prefers to lease space in downtown multimodal centers, rather than operate standalone terminals, and local management remains keen to be part of the WMTC. Greyhound's facility requirements are broadly unchanged from the 2004 study.

4.5 Taxi and Limousine Services

All licensed taxi operators in the City of Wilmington were contacted. Several responded, and their comments showed a range of opinions.

One of the larger operators said that he would be interested in leasing a dispatch office in the WMTC.

Another operator said that a dispatch office was not a good idea unless each company was offered its own office at a price that even a small company could afford to pay. He also said that a taxi stand (also known as a taxi rank) was not fair to small taxi services that give a more personal service. In terms of specifics, he saw the main issues as the number of parking spaces, and rules for drivers to follow.

Another operator pointed out that Wilmington had a small number of relatively large taxi firms and a large number of independent services. He felt that certain companies would attempt to take control of the taxi operations; every service should therefore have equal opportunity to serve, or at least access, the center. He would not want to see any one company have an advantage by placing their dispatch operations in the center. Citing experience at Wilmington International Airport, he felt this would create animosity between the companies/drivers, which would trickle down to the passengers. He was also against requiring a fee to serve the center (many operators pay a fee to serve the airport, in addition to the licensing fees charged by municipalities). In terms of specifics, he was in favor of a drivers' room that could be used by taxi drivers as well as transit drivers. Directional signage to the taxi rank should be very clear for passengers.

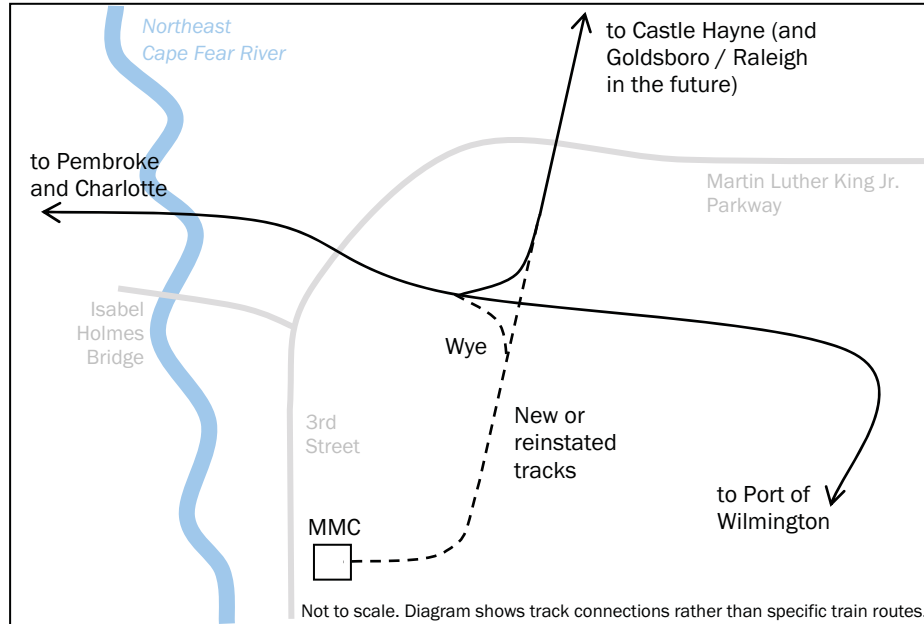
4.6 NCDOT Rail Division

Potential train services: Passenger train service to Wilmington could include inter-city service and commuter service. Inter-city service proposals were described in Section 2.15. Any long-term commuter service would serve people commuting to work in Wilmington from other counties. This would probably have a typical commuter-type schedule of three trains inbound to Wilmington in the morning, three outbound in the evening, and one midday train each way.

Train operations: The proposed WMTC would be reached by reinstating the previously-removed connection from the existing Castle Hayne line, and constructing a new curve from the Pembroke line. This would allow the WMTC to directly serve train movements to/from

Goldsboro/Raleigh or Pembroke/Charlotte (Figure 4.1). It would also create a wye for turning passenger trains. The WMTC could not be reached directly from the line serving the Port of Wilmington, but there is no prospect of passenger trains using that line. If necessary, trains on the Port line could back into or out of the station using the reinstated curve from the Pembroke line.

Figure 4.1 Future Rail Connections to the WMTC



NCDOT expects that inter-city trains will be the first type of train service at the WMTC. A central island platform would be provided for these. If commuter service was added later, an additional platform and track would be constructed. The tracks would converge to a single track east of North 6th Street. Locomotive-hauled trains would arrive, unload passengers, back out to the wye, turn at the wye, back into the station, load passengers and depart. Push-pull trains (with a driving cab in a passenger car at the opposite end from the locomotive) would not need to turn.

Site issues: NCDOT requires a minimum of 19 feet clearance (preferably 21 feet) from top of rail to the bottom of the North 4th Street structure. This will allow use of bi-level cars (approximately 17 feet high). The platform would need to be wide enough to accommodate escalators, elevators and stairs at a mid-point. The platforms and tracks should avoid the water main located on the southern edge of the trackbed.

There is no requirement for locomotives to stop a particular distance short of the bumper at the end of the track. Locomotive-hauled trains arriving at the station would have the locomotive at the west end, alongside North 3rd Street. Departing, the locomotive would be at the east end (east of North 4th Street). Locomotive exhaust extraction would be needed if the station area were to be decked over.

NCDOT wishes to provide vehicular access to the trackbed for service and maintenance. An access point at the WMTC would be very useful as there is no other access point for several

blocks eastward. The most likely location is the slope down from Hanover Street in the north-west corner of the site.

NCDOT Rail Division would prefer the future replacement of the North 3rd Street bridge to be a retained fill (not a slope) on both sides. This would reduce the land requirement and would maximize the available platform length on the site.

Building-space issues: NCDOT prefers to size its stations to accommodate peak crowds and long-term ridership growth. This means larger facilities than would be suggested by Amtrak's published standards (which explicitly cater for busy but not peak days) and current ridership. It is reasonable to build extra space that is initially used for other functions but can be converted to rail use as ridership demands. Kannapolis is a good example of this.

The long-term building space requirement should be based on a 'worst case' scenario in which a full trainload of inter-city riders and another full trainload of commuters are waiting in the evening peak. The operational issues underlying this are as follows:

- An inter-city train might be scheduled to leave Wilmington during the evening commuter period.
- Because Wilmington will be a terminus, the trains will be waiting in the platform, well before departure time (unless the service is disrupted).
- For homeland security reasons, there is pressure not to let riders onto platforms or trains until close to departure time.
- Inter-city riders tend to arrive well before departure time, so they will mostly be waiting.
- Most commuters would show up close to departure time, and normally would board the train directly. Some will arrive well ahead of time. However, if the incoming train is delayed, they would have to wait. Depending on the station layout and operational arrangements, they might wait on the platform or on a concourse.

4.7 Tour Operators

One downtown tour operator commented that the WMTC could be a potential pick-up point. However, he would still want to remain based in the heart of downtown with its heavy pedestrian traffic (and close to the visitor kiosk). In terms of specifics, helpful features at the WMTC would be a staffed visitor center, free parking, and free loading and unloading.

4.8 Other Downtown Stakeholders

Cape Fear Community College: CFCC has no major plans that might affect the WMTC, beyond those in its Master Plan (as described in Section 2.13). It has leased the trackbed for parking on an initial three-year term from NCDOT. CFCC concentrates programs on one or other of its two campuses, and this minimizes the need for travel between the two. CFCC feels that relatively few students are likely to use transit, because many attend classes before or after work and prefer to drive to save time.

Historic Preservation: The project team met with the City of Wilmington’s preservation planner and a representative of the Historic Wilmington Foundation. Several of the buildings along Campbell Street are ‘contributing’ structures, meaning that their importance is as a collection rather than individually in their own right. The Historic Wilmington Foundation has secured preservation easements on some of the nearby buildings on North 4th Street, preventing them from being demolished. Figure 6.4, on page 72, shows the contributing buildings.

Parking: The City of Wilmington Parking Manager confirmed that tour-bus parking (visitors’ buses) might be useful at the WMTC. Currently there is a very small location available downtown. The City’s Parking Advisory Committee prefers to use downtown curbspace for short-stay parking rather than bus parking. A lot of redevelopment is expected in the north downtown area in the next few years. This would require increased attention to parking management in that area, and possibly one or more new parking structures (either city-owned or through a public-private partnership (PPP)). One concern is parking spilling over into residential neighborhoods. Air rights on the WMTC site might potentially be a good place for a parking structure.

Greater Wilmington Chamber of Commerce: A representative of the Chamber of Commerce updated the project team on developments in the north downtown area. The hotel and convention center are under construction, and a mixed-use development is planned for the riverfront property further north. The WMTC would likely be a benefit to downtown. However, the more people and activity exist on or around the site, the more likely it would be to retain a good ambience. There is a need for lunchtime restaurants in the area (particularly serving PPD, Inc. employees and Cape Fear Community College staff). It could also be a convenient starting location for tours. There should be good pedestrian access east-west to and from the waterfront.

Wilmington/Cape Fear Coast Convention & Visitors Bureau: The possibility of using the WMTC as a major visitor center had been raised earlier in the study process. The Wilmington/Cape Fear Coast Convention & Visitors Bureau (CVB) was therefore contacted to ask about this. The CVB advised that it would probably not look to the WMTC to be its main visitor center. The ‘busyness’ of the WMTC would likely not sit well with the more relaxed environment and personal service that visitors needed. In addition, most visitors arrived by car (80%), so the CVB felt that although a presence on the main entry route into downtown was desirable, there was little benefit from locating within the WMTC. Although the existing location in the old courthouse had some issues, this was the best location for the long term.

However, the CVB would still like to provide visitor information in the WMTC, for people arriving there as well as for any people arriving by car for whom it was a convenient first stop. At a minimum, this could simply be an unstaffed kiosk with information displays. A better option would be to have information available from staff who would already be in place for transportation information (a ‘welcome’ desk or similar). The CVB could take care of the leaflet supplies etc. and provide staff with training on visitor-related questions. The CVB already does this at the airport for the information staff there, and it works well.

When passenger trains begin serving the WMTC, the situation might change, as visitors might arrive by train. Many of these would transfer to hotel shuttles or taxis rather than a local bus. The visitor services could be expanded at that stage, although the WMTC would still not be the main visitor center.

Tour bus parking was again mentioned as an issue.

WMPO BikePed Committee: Several members of the WMPO BikePed Committee offered overall support for the WMTC project and indicated that the 2004 specification for bicycle facilities remained valid. One member additionally commented that a critical mass of bicycle infrastructure would be needed in order to achieve the greatest success in promoting cycling: the infrastructure at the WMTC should be supported with a connecting bicycle route. Another member saw an opportunity to add a visitor center, gift shops, and food courts, starting on a small scale and expanding as the level of activity increases.

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5 Functional Requirements and Space Needs

5.1 Introduction

This section uses the information from previous sections, as well as the two previous studies in 2000 and 2004, to generate an up-to-date set of functional requirements and space needs for the WMTC.

The space needs are simply estimates for planning purposes. At a later stage of design, more detailed estimates would be needed. The more detailed estimates would reflect the chosen site layout, as well as taking specific account of building codes and the requirements of the Americans with Disabilities Act (ADA).

5.2 Key Design Goals

The key design goals for the WMTC are:

- Bringing the transportation services together, under one roof as far as possible, for maximum rider convenience as well as maximum cost-effectiveness.
- Allowing the WMTC to be fully functional without rail service, but allowing rail service to be easily added in the future.
- Allowing for phased expansion from short-term to long-term needs. In particular, strong growth in local transit service levels is expected within the WMTC's lifetime.
- Providing a level and quality of service that reflects a growing, forward-thinking city and downtown (as opposed to a suburban or small-town feel).
- Minimizing vehicle-pedestrian conflicts, as well as conflicts between buses and cars. Their circulation and site entrances should be kept separate.
- Providing a site layout and phasing that allows for ultimate build-out of the site with mixed-use development at a high density (particularly by using air rights). The western part of the site should ultimately reflect the anticipated expansion of downtown into this area. The eastern part should also be relatively dense, but on a smaller scale in line with the traditional character of North 4th Street.
- Preserving or adapting as much of the site's historic fabric (buildings and brick street) as is feasible given the other needs.
- The WMTC should be seen as (and should be) an important, attractive and safe public facility. It should be seen as part of the community and as part of the urban environment. It should contribute to the area's streetscape, activity levels and sense of place. The ideal design would reflect this in its layout, its architecture and its connections to adjoining uses. The site layout should also minimize the impacts on nearby residential locations.

5.3 Transportation Requirements

5.3.1 Summary of Transportation Requirements

The transportation requirements for the center are as follows:

- The operational and passenger/package/baggage facilities required by Wave Transit and Greyhound. This includes bus bays and building space.
- Space for Wave Transit vans, other human-service vans, courtesy shuttles and tour operators to drop and collect riders. No other specific facilities are required for these operators.
- Common areas for circulation, public restrooms, building systems, and building management and security.
- Small amounts of additional, flexible building space that can be used by one or more taxi firms, rental car firms, visitor services or retail /food outlets.
- A taxi stand, pick-up/drop-off area, and car parking on-site or nearby.
- Provision for bicycle parking and a 'bicycle station'.
- Provision for passenger rail, even if the rail facilities are not provided initially. This includes platforms and building space for waiting, ticketing and baggage-handling.

The resulting space needs are based on the operators' stated requirements and general design standards. The requirements for rail services assume that rail will share the main site and building, so that common facilities such as waiting areas and restrooms can be shared. If the rail facilities are to be in a separate building, these common facilities will need to be duplicated, but the duplicates would not be constructed as part of an initial center without rail. The City's preference is for WMTC employee parking to be accommodated on-street or in off-street public parking locations, rather than being provided directly at the WMTC site. Employee parking is therefore not included in the space requirements.

Table 5.1 summarizes the space requirements. The following text provides more detail on the requirements and the reasoning behind them.

5.3.2 Wave Transit

Bus bays: This requirement has changed substantially from the 2000 and 2004 studies. Those studies listed a requirement for seven buses, three smaller vehicles (Airport shuttle and two trolleys) and 5 paratransit vans. The new requirement reflects a longer-term outlook with substantial growth expected in the Wave Transit network.

As Section 3 described, the target is for 15 bus bays (of which some should be able to accommodate articulated buses), plus additional space for the existing downtown trolley, a potential future reverse trolley, and paratransit vans that may be picking up, dropping off or transferring riders.

The recommended number of bus bays is therefore:

- 13 sawtooth bays for 40-foot buses,
- two sawtooth bays for 60-foot articulated buses (making a total of 15 buses),
- two stops for trolleys, and

- five spaces for paratransit vans (same figure as in 2000 and 2004 studies).

The *minimum initial* provision should be:

- seven sawtooth bays for 40-foot buses (for the existing pulse of five routes, plus the two short-term aspirations described in Section 3), and
- one stop for the downtown trolley.

The trolley stops should be on North 4th Street, as the downtown trolley runs directly along the street and does not need to enter the WMTC to turn. Some of the bus bays can also be on-street if required by the site layout and dimensions. A covered waiting/boarding area should be provided alongside (and connecting between) all bays.

Building space: The 2000 and 2004 specifications included a total of 1,825 sq ft of office and storage space for the two transit agencies existing at that time: the Wilmington Transit Authority (225 sq ft) and New Hanover County Transportation Services (1,600 sq ft). Since then, the situation has changed. The two agencies have merged to become Wave Transit, and its operational base is now firmly expected to be at the future Central Station and the maintenance facility on Division Drive.

The WMTC therefore now only needs to accommodate a basic set of functions for Wave:

- Ticketing – one counter 100 sq ft
- Office / cash handling / driver breakroom 225 sq ft
- Employee restrooms (male and female, each single-stall) 150 sq ft

These figures are similar to those in the 2004 study, except for the reduction in office space and an increase in employee restroom space. Waiting and public restrooms are expected to be shared with other services, and are described separately below.

5.3.3 Greyhound

Bus bays: Greyhound continues to require four canopied bays, in echelon (or ‘pull-in’) layout, for its 45-foot motorcoaches. This requirement reflects the potential for two routes boarding or alighting at once; on the busiest days, each route may be ‘duplicated’ with two buses running together. No refueling or dumping facilities are required. Because of the importance of baggage transfer, the bays should be adjacent to the Greyhound baggage office.

Building space: The building space needs are unchanged from the 2004 study, and include:

- Baggage and packages – directly alongside the bus bays 290 sq ft
- Ticketing – two ticket windows and one package express window 180 sq ft
- Manager’s office 108 sq ft
- Secure storage 76 sq ft
- Drivers’ room 66 sq ft
- Employee restroom (single-stall, unisex) 75 sq ft

Waiting and public restrooms are expected to be shared with other services, and are described separately below.

Parking spaces: The customer parking needs are unchanged from the 2004 study:

- 20 short-term parking spaces
- 2 spaces for package express loading/unloading, close to the baggage area.

5.3.4 Rail Services

Platforms: As described in Section 4.6, the NCDOT Rail Division envisages a 600-foot center island platform for inter-city services (likely the first to be built) and a 400-foot platform for commuter services (likely the second to be built). To put this into perspective, a typical passenger car is 85 feet long. Each platform should be at least 20 feet wide, to allow for vertical circulation at a mid-point, and should be straight or as close to straight as possible. Locomotive exhaust extraction will be required if the tracks are built-over. A potable water source and 480 volt electric supply would be needed for train servicing.

Building space: The building space needs include:

- Ticket office – three windows (one acting as baggage intake)480 sq ft
- Baggage (typically 20ft x 30ft or more) (roll-up doors to platform)600 sq ft
- Lead agent’s office256 sq ft
- Break room (with lockers, can act as conference room)320 sq ft
- Operations room (four employees)400 sq ft
- Employee restroom (single-stall, unisex)75 sq ft

The only change from 2004 in this list is that no specific provision is made for handling mail and parcels. Amtrak withdrew from this business several years ago. However, the allowance for baggage area could cover a limited mail/parcels function if necessary. Waiting and public restrooms are expected to be shared with other services, and are described separately below.

Parking spaces: Inter-city rail service is likely to generate both short-stay and long-stay parking demand. Having convenient parking available is an important part of the rail travel experience and the overall product. As a worst-case scenario, it is assumed that downtown Wilmington will be the only station in the Wilmington metropolitan area (a park-and-ride station on the edge of the urban area is possible, but is not currently planned). Based on the anticipated service pattern, existing travel behavior and the forecast ridership (see Section 5.3.5 and Appendix 8), approximately 300 spaces may ultimately be required. Appendix 9 shows how this figure was generated. Some of these spaces should be short-stay spaces, for people parking while dropping-off riders. The long-stay parking is likely to be in a structure, possibly as part of a public-private partnership (PPP).

5.3.5 Waiting Areas

Wave: The 2000 and 2004 studies included 1,050 sq ft of waiting area, which broadly corresponds to a design volume of about 70 people waiting at once. This reflected an estimated maximum of 50-60 people. Given the long-term increased service levels for which the WMTC is now being designed, it is recommended that this figure be increased to 1,500 sq ft, a design volume of 100 people waiting at once. This amount represents an indoor concourse area; in practice, if there are separate sheltered areas at the bus bays, many riders will wait there and the concourse area could be reduced.

Greyhound: The estimated waiting area requirement is 736 sq ft with seating for 30 people. This is unchanged from 2004.

Rail: The 2004 study, which only envisioned inter-city riders, specified 1,500 sq ft of waiting area. The requirement is highly dependent on ridership forecasts and on the mix of riders (inter-city riders are more likely to require space, and individually require more space, than commuters). As described in Section 4.6, the waiting area requirement is now based on a worst-case scenario of a trainload of inter-city riders and a trainload of commuters both waiting on the concourse at once. This might be expected if an inter-city departure is scheduled during the evening commuter peak. When the service is operating normally, most commuters will proceed straight to their train. However, when disruption occurs (such as the incoming train running late), they may have to wait.

- For inter-city riders, an annual ridership range of 50,000 to 110,000 inter-city passengers (spread over four trains per day) is assumed. Appendix 8 explains how this range was derived. Using Amtrak's station standards, this ridership range would require approximately 500 to 1,000 sq ft of waiting area⁸. However, as described in Section 4.6, NCDOT prefers to exceed the Amtrak standard in order to comfortably accommodate ridership on the busiest days such as around Thanksgiving (which Amtrak's standard does not) as well as to provide margin for growth. A target of 1,500 sq ft is therefore recommended for the inter-city waiting area.
- For commuters, ridership of up to 360 per train is assumed. Appendix 8 explains how this figure was derived. A waiting area of 3,600 sq ft would accommodate these riders⁹. This could mostly be standing area on a concourse, rather than a seating area.
- The total area from these two calculations is 5,100 sq ft. In practice, however, the large commuter waiting area would be unused on most days and would therefore provide additional space for inter-city riders. It is therefore reasonable to reduce the overall total.

Based on these calculations, it is recommended that the rail waiting/concourse area be designed for 1,500 sq ft of inter-city waiting space, with provision for long-term expansion to a total of 4,500 sq ft representing commuter service and/or additional margin for growth.

Reduction for shared use: A shared waiting area is desirable for greatest efficiency. Because the number of people waiting for each service (train, Greyhound or Wave Transit) is likely to peak at different times of the day, the space needed can be reduced (the whole is less than the sum of the parts) if the site layout allows. A shared waiting area also means that higher-than expected ridership for one service can be accommodated using the space nominally allocated to another.

The 2004 study assumed the rail and Greyhound waiting areas would be shared, with a 30% reduction in space needs, but that the Wave Transit waiting areas would not be shared. Because the recommended rail waiting area is now much larger, this 30% reduction may no

⁸ Based on the standard for corridor service. Using the standard for long-distance service, up to 1,150 sq ft would be required.

⁹ Assuming all commuters stand, at 10 sq ft each. This represents level-of-service C, using the guidelines in the *Transit Capacity and Quality of Service Manual* (TCRP Report #100), Exhibit 7-8.

longer be appropriate. At this stage, no reduction for shared use has been assumed. However, a reduction may still be possible once the site layout is more firmly known.

5.3.6 Other Shared Facilities

Building management, reception and security offices: It is assumed that the center would have unified management under a building manager (possibly with a roster of duty managers). The 2004 study listed an 81ft security office. It is recommended that this requirement be expanded to 300 sq ft to allow for a separate manager's office and a small 'customer reception' waiting area for non-passenger visitors and for passengers who need particular help. This reflects contemporary customer-service practice in relatively large multi-modal centers.

Restrooms: As in the 2004 specification, the public restrooms should be separate male and female facilities, each with baby-changing facilities, of approximately 550 sq ft each. This assumes the site layout will allow a single pair of restrooms to serve all riders. Employees who are not provided with dedicated restrooms (as described above) would use the public restrooms.

Food service and/or retail space: Although the WMTC would function adequately without food and/or retail space, it is desirable to provide this (unless there is already suitable food/retail service very close to the WMTC). It will increase rider convenience, add to informal security, and potentially draw people into the center. No allowance was made in the 2004 study.

The space requirement is flexible and the amount to be provided will likely depend on the site opportunities. For site planning purposes, 1,000 sq ft has been assumed. As an illustrative example, 1,000 sq ft would accommodate a coffee shop or snack bar with seating, or two smaller units. A 500 sq ft site would accommodate a small kiosk. A full restaurant or 'main street' type of store would require 2,000 sq ft or more.

Visitor kiosk: As described in Section 4.8 above, the WMTC is not expected to have a major visitor-information role. It is recommended that 100 sq ft be allowed for a standalone visitor information booth and/or a phone bank for hotel reservations. In the early stages, however, this function would likely be carried out by other staff or by brochure racks. There was no allowance for this in 2004.

Miscellaneous facilities: Small amounts of space should be allowed for telephones, vending machines, drinking fountains and an ATM. These should be in clear view but out of the main circulation area – effectively in alcoves. (Vending machines are needed irrespective of whether or not other food services are present, as the other outlets may not be open during all hours of transportation service.) Sufficient wall space should be available for schedule and other posters, leaflet racks, and possible future real-time information screens.

Other space: Some space, depending on the design, will be taken up by corridors, lobbies, and (in a multi-level design) stairs, elevators and possibly escalators. Additional space will be needed for mechanical and electrical systems. An allowance has been made for these in Table 5.1. The estimate can be refined as the design develops.

5.3.7 Taxi, Car Rental and Other Facilities

Building space: Many multi-modal center designs allow space for one or more taxi firm dispatch offices. The 2004 specification did not include this space, and (as described in Section 4.5) there are concerns about whether this would be appropriate in Wilmington. For site planning purposes, the recommendation is to allow 300 sq ft (corresponding to three or four small kiosks) that could be used flexibly for any combination of taxi firm offices, rental car kiosks, tour operators, visitor services or small retail outlets, as future needs dictate. There was no allowance for this in 2004.

Taxi stand: A taxi stand (also known as a taxi rank) with at least six spaces should be provided. This figure is unchanged from the 2004 specification. The stand would mainly serve passengers arriving on trains and inter-city buses, so it should ideally be close to these arrivals. It could be on-street or off-street.

Parking spaces: Rental cars could use a few dedicated spaces within the general public parking area, if required. An allowance has been made for these in Table 5.1.

5.3.8 Other Pick-Up and Drop-Off

A curbside loading lane should be provided for private vehicles, courtesy vans, taxi drop-off, etc. This would also be available to any tour operators who chose to pick up or drop off at the WMTC. No length was given in the 2004 specification and in reality it will depend on the site layout.

5.3.9 Bicycle Facilities

Bicycle parking should be provided. This is primarily aimed at people who cycle to the center, leave their bicycle and take other modes onwards. It would also serve anyone commuting into Wilmington and cycling to their final downtown destination. Both lockers and ordinary racks should be provided, to suit individual preferences. The precise numbers should be decided nearer the time of construction, in consultation with stakeholders. It is suggested that a minimum of six lockers and racks for twenty bicycles be provided initially, with ample space for expansion.

The site design should include a site for a 'bicycle station.' This would provide tune-ups, repairs and possibly valet service for commuters, and could also provide bicycle rental for visitors. It would need around 500 to 1,000 square feet, with the larger space offering opportunities for bicycle retail. It has no particular adjacency requirements. Bicycle stations are typically operated by a local bicycle store as a concession.

5.3.10 Homeland Security Requirements

Most homeland security requirements for transportation centers are essentially good-practice points for site layout design¹⁰. There are no specific space requirements. There is a possibility that future homeland security requirements would involve airport-style screening or other equipment for rail passengers. However, this is very much an unknown, and no specific space allowance should be made at this stage.

A major principle is to have layered spaces: the more critical a function is, the more it is closed/distant from the public. This should be reflected in the building layout. (The same principle is used for designing cash-handling spaces). This is most relevant at the detailed design stage. The current homeland security advice is to avoid locating parking under a transit building or on its rooftop; this (along with ambience/maintenance issues) represents one of the factors that would need to be balanced if air rights were to be used for parking.

5.3.11 Summary of Building Space Requirements

As shown in Table 5.1, the total estimated long-term building space requirement is approximately 17,400 sq ft. This compares to an estimate of 14,700 sq ft in 2000 and approximately 9,100 sq ft in 2004. The difference between the 2000 and 2004 estimates was mainly due to reduced requirements for waiting areas and restrooms. The difference between the 2004 and 2009 estimates is mainly due to an increased emphasis on meeting long-term growth needs, and specifically includes:

- additional waiting area for Wave Transit riders,
- additional waiting area for rail passengers,
- reduced office space for local transit,
- addition of retail/food space and flexible kiosk space to the specification,
- addition of a bike station to the specification,
- increased allowance for building-management space,
- various other updates to specific requirements, and
- allowance for unassigned space such as corridors and mechanical spaces.

It is important to reiterate that the entire space need not be built or fitted-out initially. Some of the space recommendations are allowances only, and may never be required. Depending on the site design and other needs, space that is not needed in the near-term for transportation purposes could be leased to other users. This approach has worked successfully in locations such as Cary.

¹⁰ *Transit Security Design Considerations: Final Report, November 2004* (USDOT / FTA). FTA report #: FTA-TRI-MA-26-7085-05. DOT Report #: DOT-VNTSC-FTA-05-02

Table 5.1: Summary of Space Requirements

Function	2004 space (sq ft)	Building space (sq ft)	Bus Bays (#)	Vehicle type and layout	Parking (spaces)	Drop-off / Other rank (spaces)	Basis of calculation	Notes
Wave Transit								
Ticketing	100	100					2004 study	
Staff/storage office	1,825	225					2004 study	2004 study included 1600 sq ft for County paratransit staff - no longer applies
Employee restroom	75	150					Wave request	2004 study included one unisex stall. Current figure represents one stall for each gender.
Bus bays			13	40-foot sawtooth			Agreed by steering committee.	Target of 15 represents 13 'best guess' plus 2 'margin of error'. Initial requirement of 7 or more (existing 5 on pulse plus two potential short-term routes).
			2	60-foot sawtooth			Agreed by steering committee.	
			2	trolley-size on street			Agreed by steering committee.	
			5	van-size			2004 study	
Greyhound								
Baggage and packages room	290	290					2004 study	Close to Trailways baggage bays
Ticketing	180	180					2004 study	
Manager's office	108	108					2004 study	
Secure storage	76	76					2004 study	
Drivers' room	66	66					2004 study	
Employee restroom	75	75					2004 study	
Bus bays			4	45-ft echelon			2004 study	Should be echelon parking adjoining Trailways part of building.
Short-term parking					20		2004 study	Short-stay parking for 'seeing-off'
Package express loading/unloading						2	2004 study	Close to baggage area
Passenger Rail								
Ticket windows	480	480					2004 study	16X30 ft, three windows. Current Amtrak standard is for 6 linear feet per window.
Baggage	920	600					2004 study	Excludes 320 sq ft of mail lock-up that the 2004 study included
Manager's office	256	256					2004 study	
Breakroom	320	320					2004 study	Including employee lockers; also usable as conference room
Operations space	400	400					2004 study	4 employees @ 100 sq ft each
Employee restroom	75	75					2004 study	
Platform						1 island platform. 600 feet x 20 feet 1 platform 400 feet x 20 feet.	NCDOT specification (also reflects AREA and Amtrak standards)	600 foot platform for inter-city service, 400-foot platform for commuter service. To be built when required. Current Amtrak standard prefers 24ft width for island platform (min 20ft). NCDOT length requirement exceeds relevant current Amtrak minima.
Servicing						Water + 480V supply	Amtrak standards	Potable water and electric shore-supply for train servicing.
Parking					300	6	See text	Mostly long-stay, but some short-stay for 'seeing-off'
Waiting areas								
Wave riders	1,050	1,500				2	Agreed by steering committee.	Increased from 2004 study in light of service expansion projected. New figure corresponds to around 100 riders (50% standing at 10sf each, 50% seated at 20sf each)
Greyhound riders	736	736					2004 study	
30% reduction for sharing	-186	0					See text	Actual reduction in 2004 was to a convenient round number and was not actually 30%
Rail riders - inter-city	1,500	1,500					See text	
Rail riders - commuter and expansion	0	3,000					See text	
30% reduction for sharing	-450	0					See text	Actual reduction in 2004 was to a convenient round number and was not actually 30%
Building management and other common areas								
Offices (building manger, reception and security)	81	300					Allowance	Increased from 2004 study, representing higher quality of service
Janitorial		100					Allowance	Did not appear to be included in 2004 study
Restrooms	1,100	1,100					2004 study	
Food service and retail space		1,000					Allowance	This figure can be very flexible
Visitor kiosk		100					Allowance	Did not appear to be included in 2004 study
Alcoves for vending machines / ATM / fountains / phones		150					Allowance	Did not appear to be included in 2004 study
Parking for service vehicles					5		Allowance	
Taxis / car rental / shuttles / etc.								
Office/kiosk space		300					Allowance	Allows up to 3 taxi offices / car rental kiosks / retail in any combination. Not included in 2004 study
Taxi rank						6	Allowance	Arbitrary number.
Parking spaces					10		Allowance	Mainly car rentals. Can be within public parking for site.
Facilities for cyclists								
Bike lockers						6 lockers	Allowance	Outside the building. Allow room to expand.
Bike racks						racks for 20 bikes	Allowance	Outside the building. Allow room to expand.
Bike station		750					Allowance	Not included in 2004 study
Subtotal	9,077	13,937	26		335	16		
Allowance for corridors, walls, stairwells, and mechanical/electrical spaces	0	3,484					25% of the subtotal	Did not appear to be included in 2004 study. 25% uplift is in line with Marsolan report recommendation.
Total	9,077 sq ft	17,421 sq ft	26 bays		335 spaces	16 spaces		

Table continues on next page with notes and additional information

Table 5.1, continued from previous page

Notes

1. This table is for planning purposes only, and includes allowances for an ideal range of functions, over the long-term life of the center. Some spaces may not be built or fitted-out initially.
2. Table includes an allowance for leasing space for food and retail areas aimed at travelers. Any additional unrelated leasing space (e.g. offices or unrelated retail) is excluded.
3. Table is based on advice from NCDOT Rail Division and other service providers, as well as the following standards, guidelines and other sources. The standards are not always consistent, and may have been adjusted to reflect specific service patterns, traveler markets and operational needs for this location.
Transit Capacity and Quality of Service Manual (TCRP Report #100): Part 7: Stop, Station and Terminal Capacity
Amtrak Station Program and Planning Standards and Guidelines, version 2.2, March 2008
Advice from NCDOT Rail Division and other service providers.
Wilmington MMC Site Evaluation Report, 2004
Railroad Station Study - Piedmont High-Speed Corridor: Final Report for the NCDOT Rail Division (Marsolan Associates, February 26, 1997)

Floorspace breakdown using the space categories in the 2004 MMC study:

	2004	2009
Rail	2,376	2,056
Greyhound	720	720
Local Transit	1,925	325
Waiting	2,650	6,736
Building management / systems / food / ret:	81	5,134
Restrooms	1,325	1,400
Taxi/Bicycle/etc.	0	1,050
Total	9,077	17,421

Floorspace breakdown if rail or Greyhound are in single-user buildings:

<u>Rail</u>		<u>Greyhound</u>	
Rail space as listed above	2,131	Greyhound space as listed above	795
Rail waiting as listed above	4,500	Greyhound waiting as listed above	736
Restrooms (reduced due to being rail-only)	800	Restrooms (reduced due to being GH-only)	500
Visitor kiosk	100	Visitor kiosk	100
Janitorial, alcoves etc	200	Janitorial, alcoves etc	250
Subtotal	7,731	Subtotal	2,381
Allowance for wasted space *	15% *	Allowance for wasted space	25%
Total	8,891	Total	2,976

* reduced as waiting is a large amount of the subtotal

5.4 Additional Leasable Space

It is desirable to provide other leasable space for non-transportation-related use. This would provide ‘busyness’ and informal surveillance, as well as potential income to offset operating costs. The space might be used to meet any community needs identified in separate planning processes.

These facilities are not included in the table of space requirements. They have flexibility over the amount of space that could be provided, which will depend on identified needs, site opportunities and funding.

5.5 Bus Movements

Good design practice is for the layout and orientation of bus bays to broadly reflect the anticipated service patterns, but to also avoid constraining future route decisions by being as flexible as the site constraints allow – particularly by allowing buses to enter or leave in any combination of directions.

Figure 5.1 shows the potential bus movements into and out of the site, assuming that today’s route pattern remains in place with only the minimum re-routing needed to serve the center. This represents the bus movements that the WMTC would, at a minimum, need to accommodate in the short-term. Because of the street grid and the diagonal relationship between the WMTC site and the heart of downtown, several of the routes could arrive/leave from more than one direction, depending on routing choices. This is a source of both uncertainty and flexibility for the WMTC design.

Figure 5.2 shows the potential bus movements in the long-term, assuming the same range of services that was used in Section 3.3 to estimate the bus-bay requirements. This diagram cannot be seen as a firm guide to individual bus movements in the future, but rather shows the *likely balance* of arrival and departure directions. The predominant movement is likely to be to/from the south. However, there will also likely be several movements to/from the north and directly along North 4th Street.

North 3rd Street is potentially a key arrival/departure route, but it has some constraints. Currently, left turns out of the site onto North 3rd Street southbound are restricted by the sight distance along the bridge. In the future, North 3rd Street is expected to gain a median, and only right-in, right-out access to/from the site will be available, unless the design is changed to include a southbound left-over into the site. North Fourth Street and the adjoining east-west streets provide alternative routes between the WMTC and North 3rd Street.

The predominant bus movement is therefore likely to be entry from the south on North 3rd Street and exit to the south on North 4th Street. Buses to/from the north will be able to depart easily onto North 3rd Street northbound, but arrival will require either North 4th Street or a left-over from North 3rd Street southbound; this decision will in turn affect the orientation of the relevant bays and the departure route.

Figure 5.1 Short-Term Future Bus Movements at WMTC

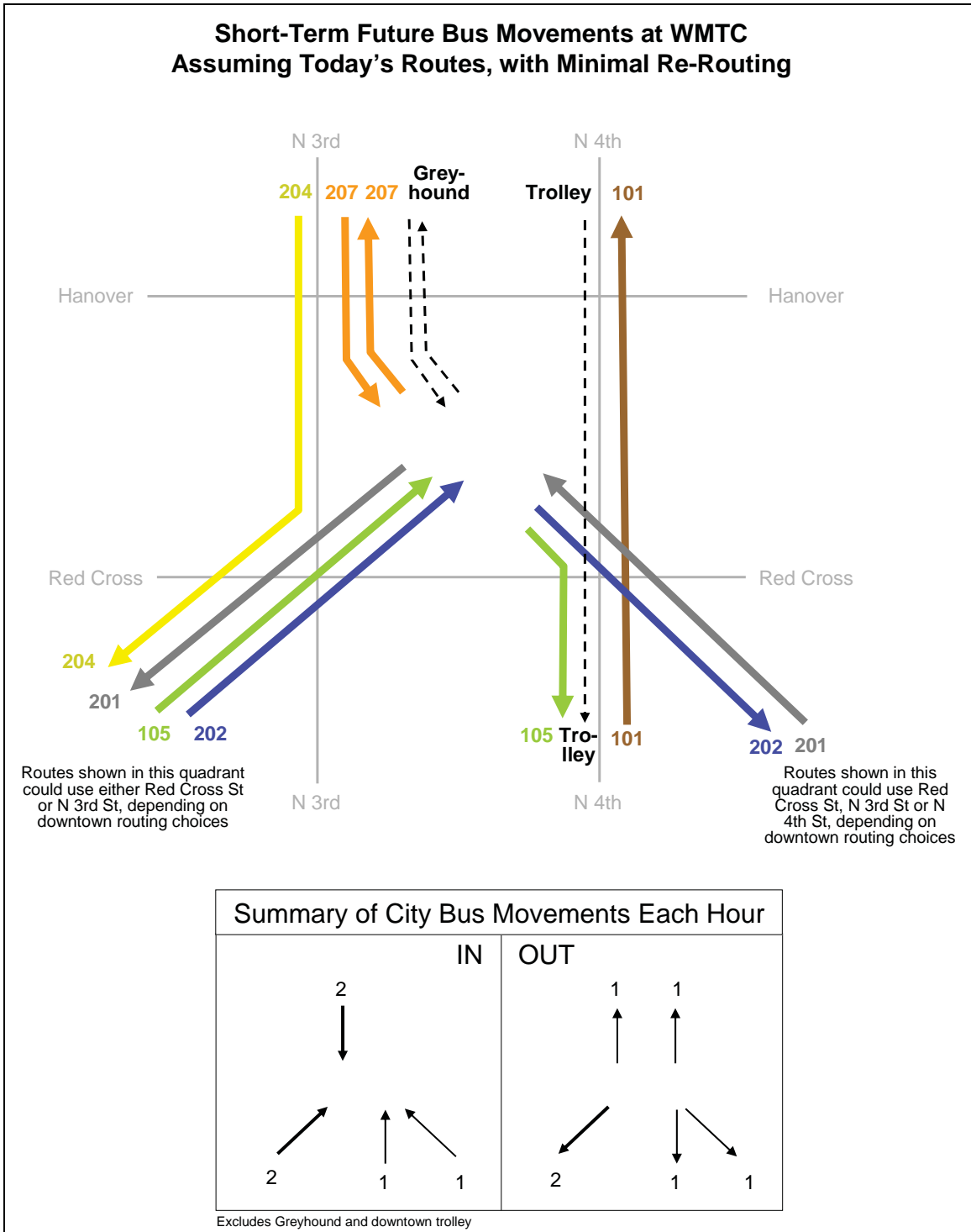
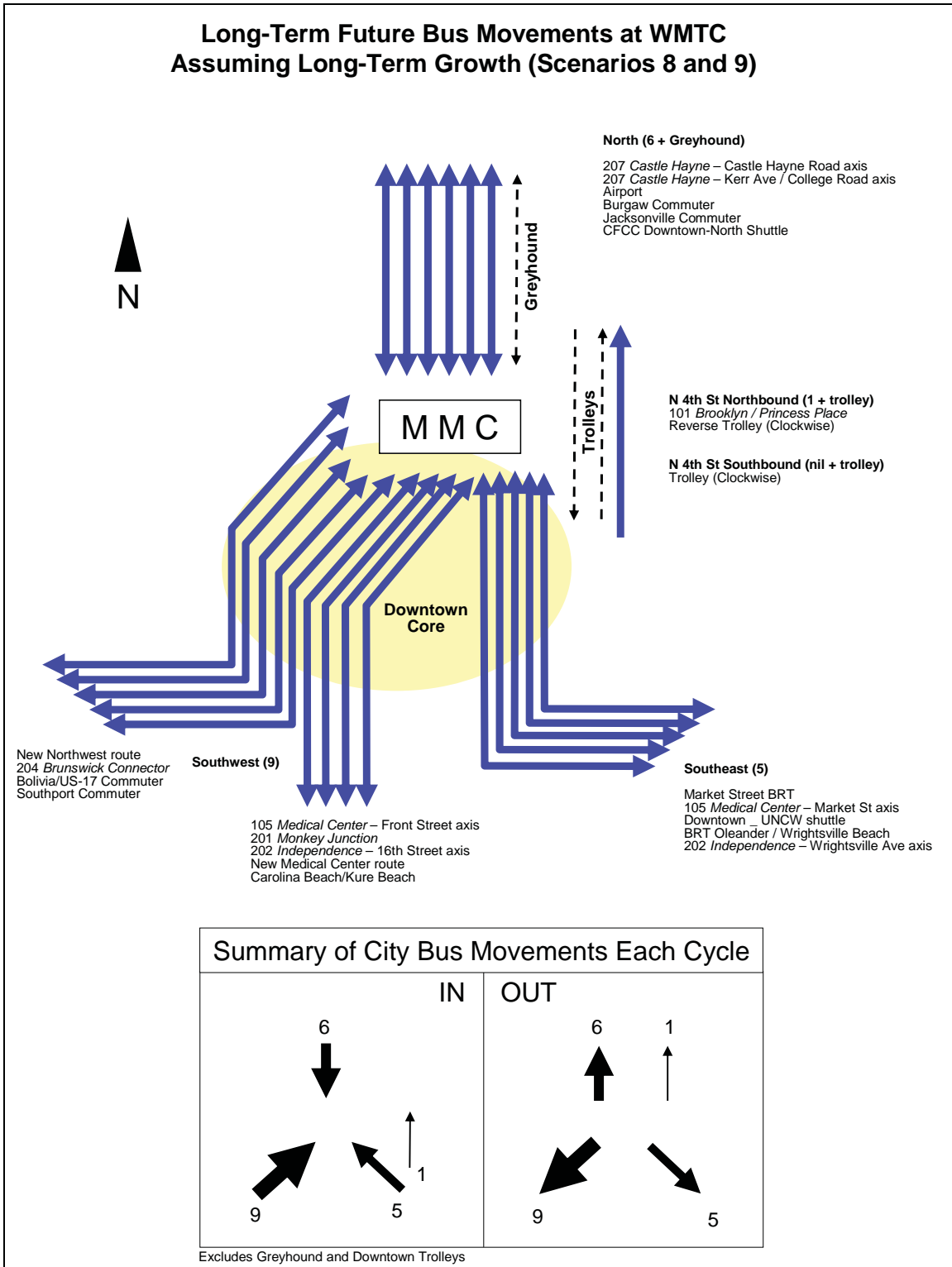


Figure 5.2 Long-Term Future Bus Movements at WMTC



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6 Site Design Considerations

6.1 Introduction

This section describes some of the key design considerations that affect the possible site layouts.

6.2 Key Site Features

The central portion of the site between Campbell and Hanover Streets, the original railroad right-of-way, is now a parking lot for Cape Fear Community College (CFCC). This is approximately 20 feet lower than the surrounding streets. Originally, the southern part of the trackbed descended to a lower level to reach the riverfront. On the WMTC site, this lower level has been filled-in to match the upper level. From North 4th Street eastwards, the two levels are still present.

North 3rd Street and North 4th Street are relatively wide and are suitable for bus access. Hanover Street and Campbell Street are brick paved and not suitable for carrying heavy volumes of bus traffic unless the bricks are removed and replaced with a modern surface.

North 3rd Street is designated as part of the Cape Fear Historic Byway.

There are three basic options for locating the bus facilities on this site:

- Use Campbell Street and/or the adjoining building sites.
- Build a concrete deck or 'slab' over the railbed, so that the bus bays will be above the future platforms.
- Use the U-Haul site.

6.3 Surrounding Land Uses and Anticipated Future Developments

Figure 6.1 shows the site in the context of the surrounding areas, with key locations highlighted. These include:

- The historic downtown to the south-west, and residential areas to the east.
- Cape Fear Community College to the west of the site, with major new buildings proposed for North 3rd Street opposite the WMTC site.
- The fledgling Brooklyn Arts District, with a mixture of commercial and residential development, to the north of the site.
- The rapidly-developing north downtown area to the north-west of the site, including the new PPD, Inc. building, the convention center under construction, and additional developments planned along the riverfront.

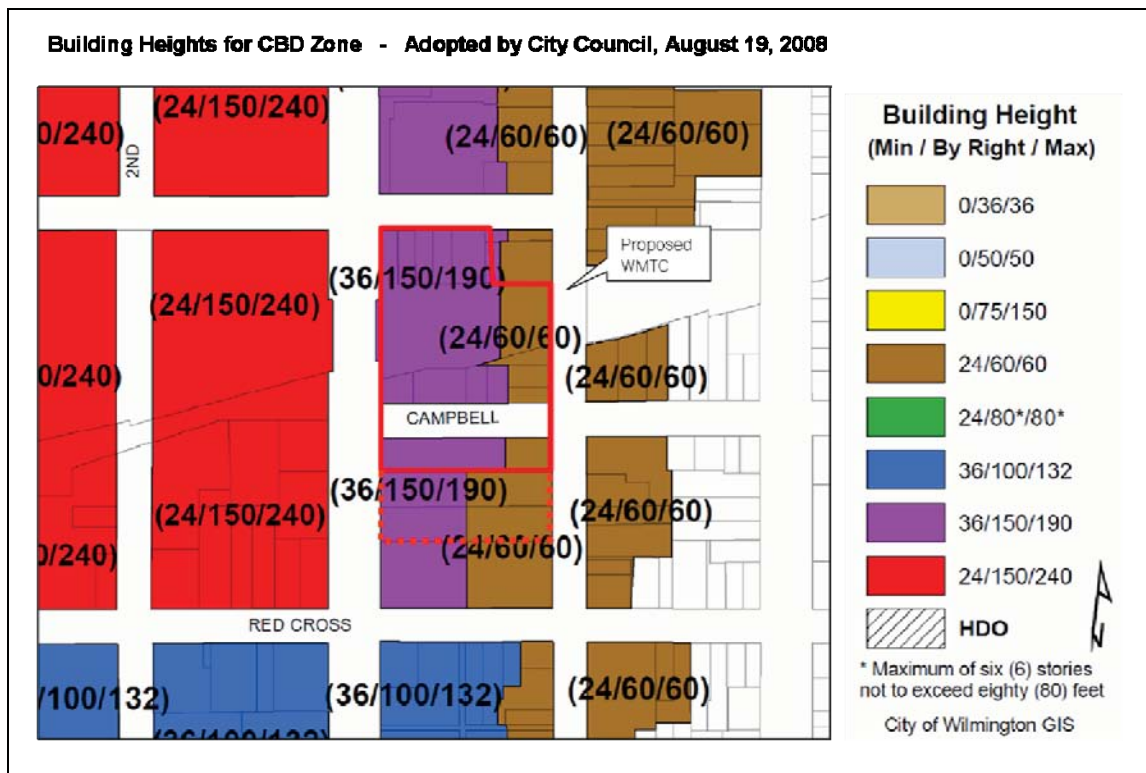
6.4 Zoning

The site is zoned CBD. The WMTC is permitted by right within this zoning class, which also imposes a number of form-based rules aimed at preserving and enhancing the area's character.

Figure 6.2 shows the allowable building heights. On the western and central part of the site, including North 3rd Street and much of Campbell Street, the minimum building height is 36 feet, and the maximum by right is 150 feet. These relatively tall values reflect the goal of creating an urban downtown feel, with strong building frontages, in this area. The existing single-story contributing buildings along Campbell Street (described below) are less than 20 feet tall, so any new buildings in this area would have to be significantly taller than the existing single-story buildings or would have to seek a variance from the zoning rule.

On the eastern part of the site, including North 4th Street, the minimum height is 24 feet and the maximum is 60 feet. This reflects the smaller scale of the existing buildings in this area.

Figure 6.2 Allowable Building Heights



Source: extracted from map supplied by City of Wilmington

6.5 Historic District and Contributing Buildings

The site is within the Wilmington National Register Historic District (shown with red shading on Figure 6.3). There are also Local Historic Districts close to the southern part of the site (shown with gray edging on Figure 6.3).

The site includes some contributing structures to the National Register Historic District. Contributing structures are not necessarily historically significant in their own right, but contribute to the overall historic significance of the district. Figure 6.4 is based on the National Register listing and shows the buildings within the site as well as some of the adjoining buildings. The contributing structures are shown in red. Other buildings within the site at the time of the listing were either too recent to be contributing (shown yellow) or had lost their historic integrity (shown green).

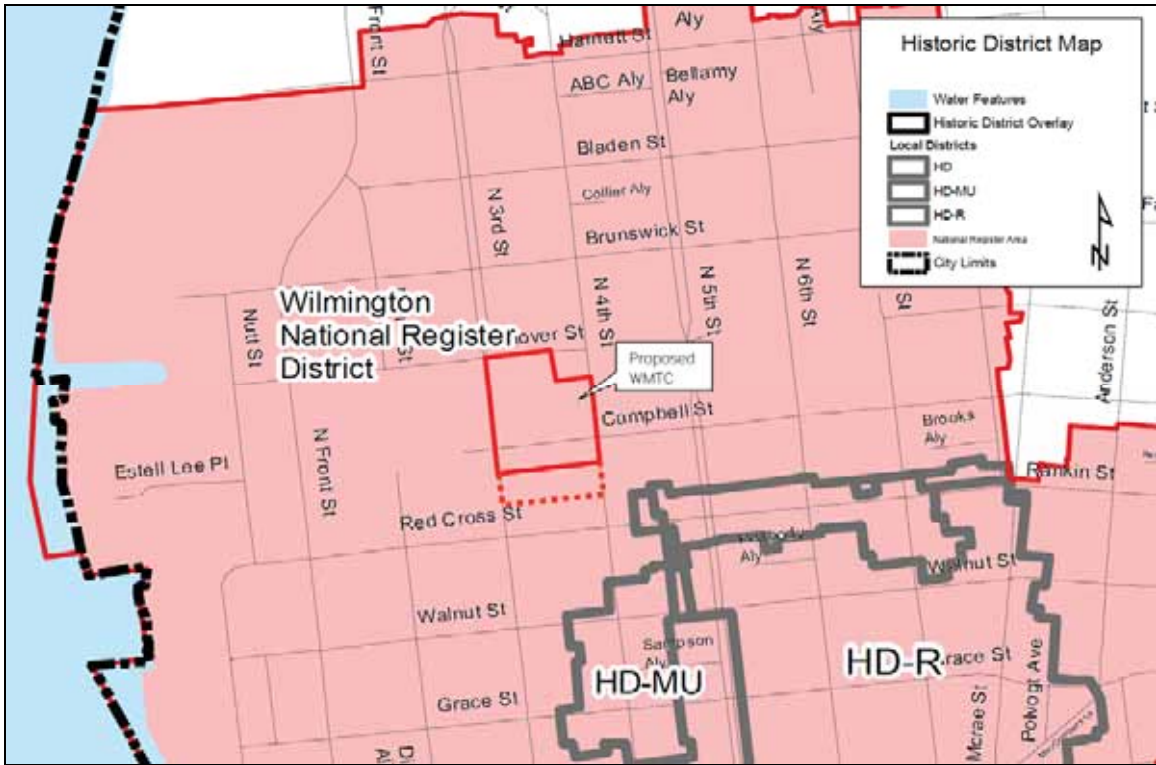
The National Register lists the contributing structures within the site as being:

- Thomas Grocery Co., 525 Campbell Street. Built around 1894. Two story brick building with recessed entry, stepped front parapet, denticulation and panels at cornice line, and segmental arch window heads.
- Neuwirth Bros. Building, 520 N 3rd St. Built 1928. One-story, L-shaped brick building with angled corner entrance bay. Rear wing has stepped parapet. [The ‘rear wing’ is also listed separately as 302 Campbell Street.]
- Commercial building, 302 Campbell Street. Built around 1920. One story, traditional commercial building with blocked up windows. [This is also the ‘rear wing’ of the Neuwirth Brothers building listed above.]
- G. Stein, 313 Campbell Street. Built around 1945. Two simple, one-story brick veneer storefronts (one higher than the other) with central entries flanked by multi-pane steel sash windows. [Note that several buildings in this area have, at various times, formed part of the G. Stein furniture store, and are therefore referred-to as the ‘Stein Building’. In this report, the term refers only to 313 Campbell Street.]

Although not a contributing structure, the brick paving of Campbell Street is also of historical interest.

A historic marker (number D-40) on North 3rd Street, alongside the U-Haul Building, marks the birthplace of the educationalist Edwin A. Alderman (1861-1931). The birthplace was a house, long demolished, between Red Cross and Campbell Streets.

Figure 6.3 Historic Districts



Source: extracted from map supplied by City of Wilmington. 'HD-MU' (mixed-use) and 'HD-R' (residential) are zoning classes that represent Local Historic Districts.

Figure 6.4 Contributing Structures



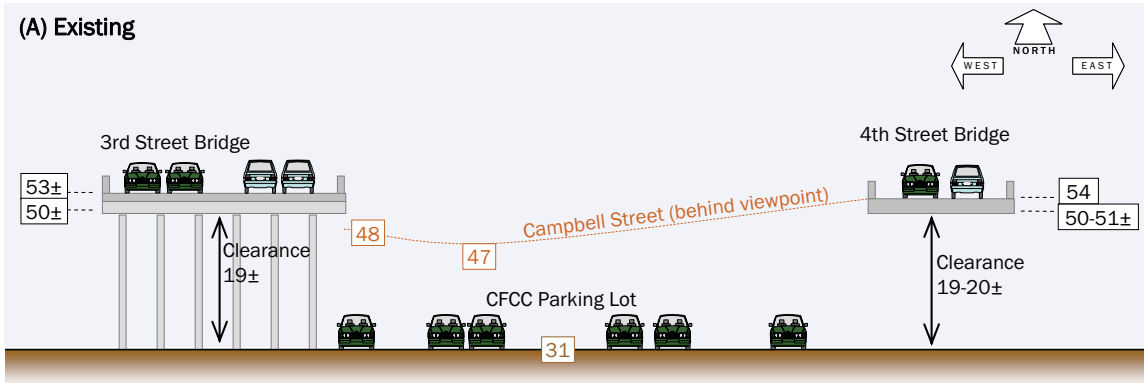
6.6 Slab and Relationship With North 3rd Street Bridge

As described above, one approach to site layout would be to build a deck or 'slab' over the trackbed. The slab would carry the bus bays and drive aisles. The structural design (particularly the placement of columns) would allow for future railroad tracks and platforms underneath.

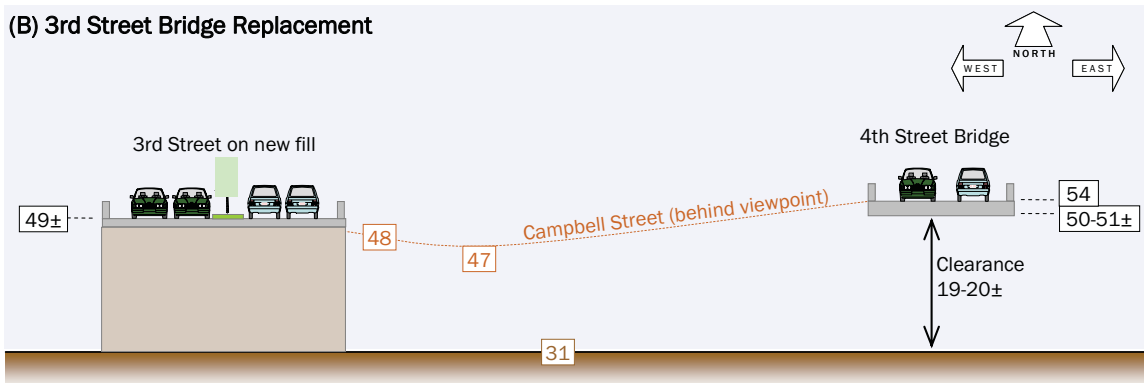
For transit, the ideal slab configuration would be east-west, with driveways onto North 3rd Street and North 4th Street. However, driveways onto North 3rd Street are not feasible, because of the elevation difference with North 3rd Street (Figure 6.5). The North 3rd Street bridge is humped (for clearance above the former tracks below), and is due to be replaced in a way that removes the hump (Figure 6.5 A and Figure 6.5 B). It would therefore not be sensible to construct a slab that connects to the bridge level. The slab would therefore require construction of the fill, with driveways provided at the new level (Figure 6.5 C). However, because the site slopes down from west to east, the clearance for trains at the west end would be limited, constraining the rail design options (Figure 6.5 D). A slab with level bus bays but with a sloped driveway (Figure 6.5 E) would have an excessive grade on the driveway.

The slab should therefore avoid connecting with North 3rd Street. A north-south orientation (or an L-shaped north-and-east orientation) would allow railroad clearances to be preserved and would make the WMTC independent of the North 3rd Street bridge replacement (Figure 6.5 F).

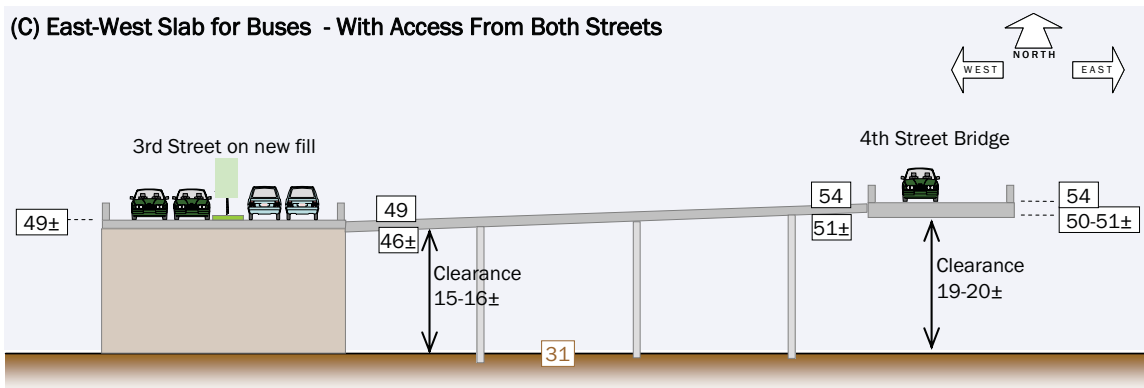
Figure 6.5 Issues with an East-West Slab



Figures in boxes denote approximate elevations in feet, based on New Hanover County GIS data and on-site estimates.



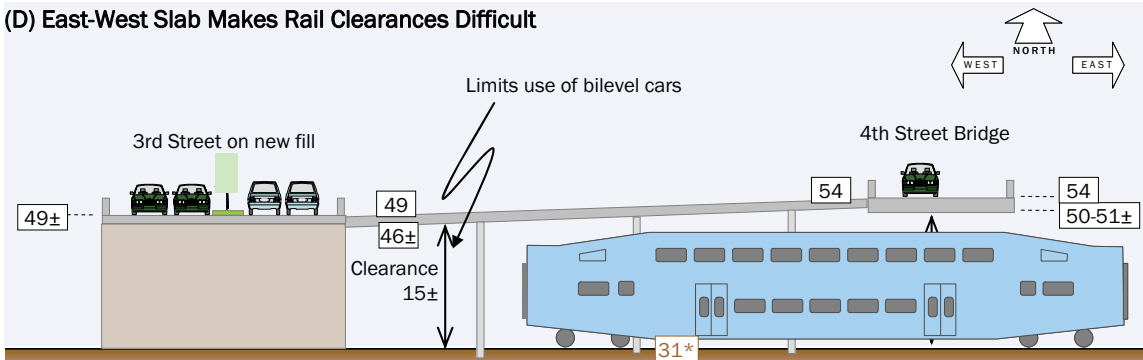
Height of new fill is assumed to match elevation of adjoining segments of 3rd Street.



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(D) East-West Slab Makes Rail Clearances Difficult

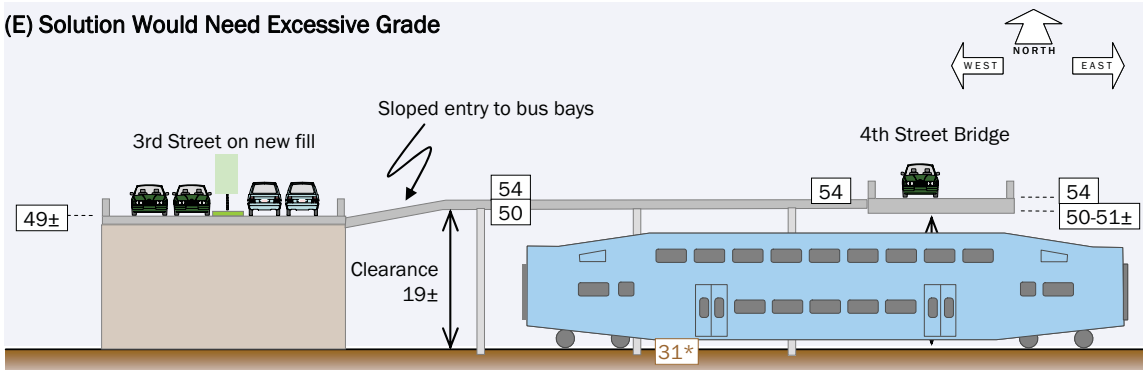


Slab makes clearance for rail vehicles problematic at west end.
Lowering the trackbed would be very expensive due to utilities.

* Assumes top of rail corresponds to existing surface (i.e. surface is lowered before adding ballast)

Car heights:
Bombardier bilevel car 15ft 11in.
Northeast Corridor bilevel car 14ft 6in.
Colorado Railcar bilevel car 19ft 9.5in.
Single level car 14 ft approx.

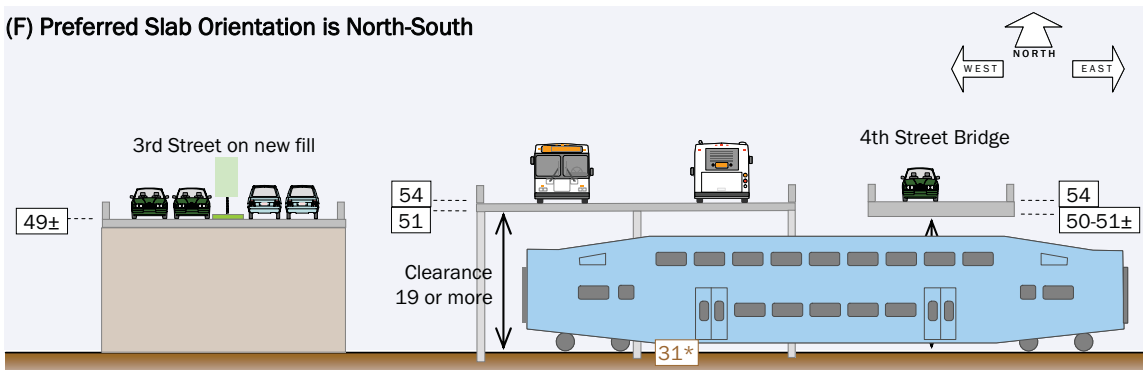
(E) Solution Would Need Excessive Grade



Bus access to/from 3rd Street would require a sloping driveway.
Gains five feet, in 40 feet or less = 12.5% grade or steeper.

* Assumes top of rail corresponds to existing surface (i.e. surface is lowered before adding ballast)

(F) Preferred Slab Orientation is North-South



Slab oriented north-south, with access from Hanover Street and/or Campbell Street. Optional access from 4th Street.

* Assumes top of rail corresponds to existing surface (i.e. surface is lowered before adding ballast)

6.7 U-Haul Property

The U-Haul property consists of three parcels south of Campbell Street. NCDOT owns a fourth, adjoining parcel. Together, these four parcels form a rectangle that extends the full width of the block, 325 feet, from North 3rd Street to North 4th Street. This is a very suitable size and shape in its own right for bus facilities.

The property is currently in use by U-Haul. The building is used for self-storage units, and the remainder of the property is used to park rental vehicles. The property currently generates City and County property tax revenue of approximately \$1,300 per year.

If an agreed purchase were not possible and the property were condemned, NCDOT could become the owner within as little as three months. However, the financial settlement would take longer and the final purchase price would not be known until the end of that process.

6.8 Comparison Between Potential Costs of Slab and U-Haul Property

This section compares the potential purchase cost of the U-Haul property with the potential construction cost of a slab. This comparison only relates to these two major cost items, and is not a full cost estimate for construction.

6.8.1 U-Haul Property

The U-Haul property acquisition cost will include relocation expenses, and possibly legal expenses if condemnation proceedings are necessary. Other costs, including asbestos removal and relocation of the self-storage units, are also uncertain at this stage. A minimum of \$150,000 is likely. It is likely that if the property were purchased, U-Haul would leave the site rather than remain as a tenant. The existing tax revenue of approximately \$1,300 per year would be lost.

6.8.2 Slab

In structural terms, the slab would resemble a large bridge structure, but would be designed specially for this situation. It would likely cost around \$200 per square foot at current prices. The optimum slab option, Option 14 as presented in the next section, would have a slab of approximately 30,000 square feet, at a cost of around \$6 million. This figure excludes the existing slopes on the north and south sides of the railbed, which would require pavement at additional cost.

7 Conceptual Site Layouts

7.1 Development of Options

A total of twenty-eight options were developed by the study team for consideration by the Steering Committee. This wide range of options was aimed at understanding what the site could accommodate in different configurations, and at understanding the necessary trade-offs between conflicting goals. The options were sketched approximately to scale, but only in enough detail to illustrate the layouts and the key outcomes.

The following section provides a commentary on some of the key issues and differences between options, **highlighting the options that appeared most satisfactory. All the options are shown in Appendix 10 for reference**, to illustrate the range of options considered. Inclusion in this report does not indicate that the option was recommended or even feasible, but simply that the option was considered. Indeed, some options were rejected quickly by the study team and the steering committee.

(text continues on next page)

7.1.1 Options Based on a Slab

As described in Section 6, a slab running east-west, with access from 3rd Street (Sketch 1), was considered not to be feasible. A slab running north-south (Sketches 2-5 and 7) is more feasible. This north-south configuration could retain some of the Campbell Street buildings and the street's urban form. However, it would require bus traffic on Campbell Street and hence the loss of the brick paving (and similarly on at least part of Hanover Street). It is also difficult to separate buses from automobiles with this configuration. An L-shaped slab running north-and-east (Sketches 4-6 and 14) would reduce the impact on Campbell Street.

Sketch 4 (shown below) shows how the brick street and the contributing structures south of Campbell Street could be retained, with the G. Stein buildings sacrificed to allow a more functional transit layout. The main buildings would need to be on the south-west corner of the northern block; they would not be connected to the North 3rd Street Bridge, and would be designed to be compatible with the future replacement fill.

Sketch 14 (shown below) develops this concept to show how the bus bays would need to be adjusted to allow the G. Stein buildings to be retained. This adjustment makes bus-to-bus transfers less satisfactory, and fewer bus bays can be accommodated off-street. The central roundabout is aimed at reducing the need for buses (particularly Greyhound) to use Hanover Street, but it could be eliminated and one or two additional bays introduced.



Sketch 4



Sketch 14

Larger versions of these sketches, along with the other sketches not shown here, are provided in Appendix 10

The L-shaped slab would be flexible in terms of transit routing, because buses could enter or leave by either Hanover Street or North 4th Street, and the streets allow buses to turn as required. However, most buses would need to use Hanover Street for either entering or leaving the WMTC, with a corresponding impact on the street environment and on the brick paving itself.

The Steering Committee concluded that Sketch 14 represented the most viable option if purchasing U-Haul was rejected.

7.1.2 Options Based on the Campbell Street Area

A second group of options (8A through 8J, 12A, 12B and 13) answers the question ‘what can we do if we avoid a slab *and* avoid U-Haul?’. Put another way: ‘can the Campbell Street area accommodate transit well and how much of the historic character could be preserved?’

A clean-slate approach to Campbell Street (Sketch 8A, shown below) would allow an excellent solution for transit. However, as the requirement to save particular buildings is introduced, the transit outcome becomes progressively worse (Sketches 8B through 8J).

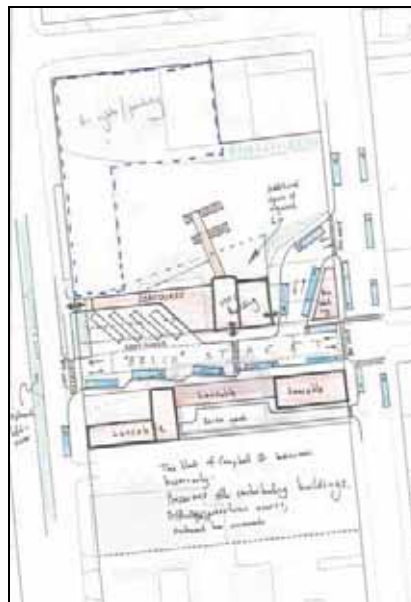
Sketch 8FF (shown below) is the best achievable solution if all the contributing structures are to be preserved. Bus-to-bus transfers are made as convenient as practicable, but only nine off-street Wave bays can be accommodated. The brick pavement is sacrificed, and is replaced with a brick-effect surface that is suitable for buses. Campbell Street retains in part the ‘look and feel’ of a street.

Sketches 12A/B and 13 show possible solutions if the brick street is to be preserved. In each case, the brick pavement is treated as a pedestrian ‘plaza’ with no vehicular traffic. The ‘look and feel’ of a street is lost. Sketch 13 (shown below) shows how two of the contributing structures could be preserved along with the brick pavement; the transit facilities become even less satisfactory, with awkward bus movements.

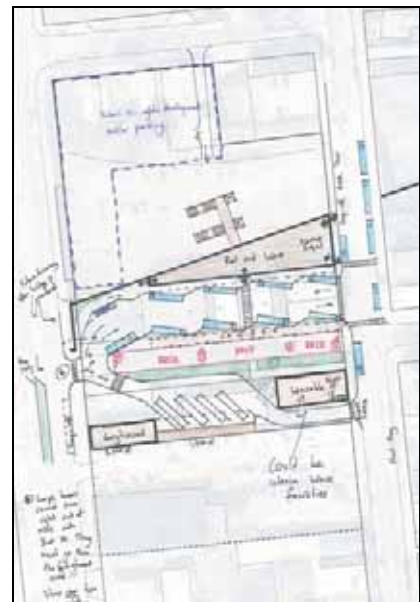
These options demonstrate that with this approach, it is not possible to meet the transit needs *and* preserve all the contributing structures *and* preserve the brick pavement. The Steering Committee therefore rejected all the options in this group.



Sketch 8A



Sketch 8FF



Sketch 13

Larger versions of these sketches, along with the other sketches not shown here, are provided in Appendix 10

7.1.3 Options That Use Both Campbell Street and U-Haul for Transit Facilities

Another group of options (Sketches 10 and 11A/B/C) involves purchasing the U-Haul site and using it, along with the Campbell Street area, for the transit facilities. All these options arrange the bus bays in a north-south configuration, to make best use of the site. The outcome for transit is very good.

Sketch 11C (shown below) is the optimum permutation within this group of options. Building frontages are provided along the majority of both North 3rd Street and North 4th Street, and there is convenient parking for drop-offs, taxis etc. The Thomas Grocery building is preserved, but the other contributing structures are eliminated. Most of the brick pavement of Campbell Street is retained as a pedestrian plaza providing access through the site and connecting the transit center with the adjoining street system. The building placement, along with sympathetic canopy design and landscaping, would ensure that the 'look and feel' of Campbell Street is retained to a great extent. In particular, the corner of North 4th Street and Campbell Street retains buildings in all four quadrants.



Sketch 11C

A larger version of this sketch, and the other sketches not shown here, are provided in Appendix 10

7.1.4 Options That Preserve Campbell Street, with Transit on U-Haul Site

The final group of options (Sketches 9A/B/C; Sketch 9B is shown below) aims to preserve the quality of Campbell Street by using the U-Haul site for bus bays. Campbell Street and its brick pavement is devoted to light traffic, with no buses, and would form the main drop-off and taxi area. The transit facilities would front onto Campbell Street, providing 'busyness', and any or all buildings could be retained. There is extensive scope for non-transit uses in existing or new buildings.

The U-Haul part of the site works well for buses. It is a straightforward site offering flexibility for building bus bays incrementally as demand grows, and/or changing the bay layouts as requirements change. It can comfortably accommodate two full rows of Wave Transit buses with generous waiting concourses for riders, or three rows of buses with much tighter concourses. Entry to and exit from the site are straightforward, and there is no need for any buses to use Hanover Street or indeed to use North 4th Street north of the bus bays. The rail facilities can be built later, without disrupting bus operations.

The main disadvantage of this group of options is that continuous first-floor building frontages cannot be provided on the U-Haul site. Careful design and detailing of the concourses can preserve an intermittent street frontage. Air rights development above the bus facilities may be possible, but the site offers limited opportunities for street-level access to any development. One option is for a development on the adjoining parcels to the south to reach over the bus facilities.



Sketch 9B

A larger version of this sketch, and the other sketches not shown here, are provided in Appendix 10

7.2 Shortlisted Options (With and Without U-Haul) and Recommendation

The Steering Committee settled on two alternatives:

- **The best of the plans with U-Haul** – this was Option 9B (preserve Campbell Street, with transit facilities on the U-Haul site.).
- **The best of the plans without U-Haul** – this was Option 14 (preserve Campbell Street, with transit facilities on a slab above the railbed).

The two options are very different in terms of transit operations, feasibility, neighborhood impacts, and their flexibility. On these issues, option 9B is strongly preferred over Option 14, because:

- Bus-to-bus transfers are more straightforward, with shorter distances and fewer driveway crossings.
- It keeps buses on the south, more commercial, side of the site, which is also closer to downtown. The north side includes the Brooklyn Arts District, a fledgling residential/arts neighborhood, and is less compatible with heavy bus operations.
- It keeps buses off Hanover Street (a brick street with similar issues to Campbell Street).
- It is a feasible scheme that could be implemented relatively simply and quickly.
- The environmental process would be more straightforward if Federal funding was sought.
- It allows for incremental expansion from one to two Wave Transit concourses – whereas the slab is most effectively built all at once.
- It avoids the need for decisions today on the precise alignment of tracks and platforms.
- It allows flexibility for use of the air rights immediately above the platforms (e.g. with building development, a tall arched roof over the platforms, open areas, or a combination of these).

The two options are different, but broadly equal, in terms of the potential non-transit development opportunities (Table 7.1). The slab option (Option 14) allows the U-Haul site to be developed unencumbered by transit facilities, but it makes development on the railbed site (above both the tracks and the bus bays) more difficult and less cost-effective. The U-Haul option (Option 9B) allows development on the railbed site (above the tracks) unencumbered by bus facilities, but it makes development on the U-Haul site more difficult and less cost-effective.

The two options also have similar impacts on Campbell Street and its historic structures, pavement and character.

7.3 Final Recommended Site Layout

Figure 7.1 (on page 85) shows the recommended site layout. This represents a refined version of Option 9B.

Wave Transit vehicles would pull up at the two concourses (north and south) and at the south side of the Neuwirth Building, which would be renovated to house Wave Transit ticketing and waiting facilities. These vehicular areas can accommodate a total of 12 full-size Wave Transit buses (including up to two articulated buses) at any time. They can also accommodate more than 12 vehicles if some are small shuttle-type buses or paratransit vans rather than full-size buses. If additional buses ever need to be accommodated, additional space is available:

- by using the Greyhound bays at times when Greyhound buses are not present. These bays are particularly suitable for commuter services provided by 45-foot motorcoaches.
- by stopping on North 3rd Street or North 4th Street. This is particularly suitable for buses that are using those streets anyway and would be passing by the site, such as the current 101 *Brooklyn/Princess Place* route.

The Wave Transit bus bays are in two concourses facing east, plus additional stops alongside the Neuwirth building facing west. This reflects the predominant pattern of routes, with most routes arriving/departing to/from the south. The second concourse could be omitted initially and only built when required. The concourses are shown with individual canopies, but the entire bus facility could be fully covered.

Paratransit vans could use the curb on the south side of the Neuwirth Building, which can accommodate three vans comfortably and four vans if required. If this space were needed for full-size buses, the vans could use Campbell Street or any available bus bay.

The existing trolley route and a potential additional trolley route in the reverse direction can stop on North 4th Street, without deviating from their route, or can use any of the bus bays if that is preferred.

The existing Neuwirth building would be rehabilitated and would be used for Wave Transit ticketing and waiting, and potentially some of the other facilities such as restrooms.

A new building facing Campbell Street would fill the gap between the Neuwirth and Thomas Grocery buildings. Greyhound ticketing/baggage would be in this building, possibly at the eastern end. The south side of the building would be a Greyhound waiting area, and the north side would be a lobby for arrivals, people waiting to be picked-up, etc. It would also accommodate some ancillary facilities such as restrooms. It would likely be a two-story building with the upper level devoted to back offices and/or a void above the waiting or lobby areas. It could provide an airport-quality experience for riders, along with an exterior frontage that respects the historic character of the street.

The Thomas Grocery building would be rehabilitated. It could accommodate ancillary facilities such as back offices, or could be street-oriented leasable space, or a combination of both. It might be the best location for a ‘bicycle station’.

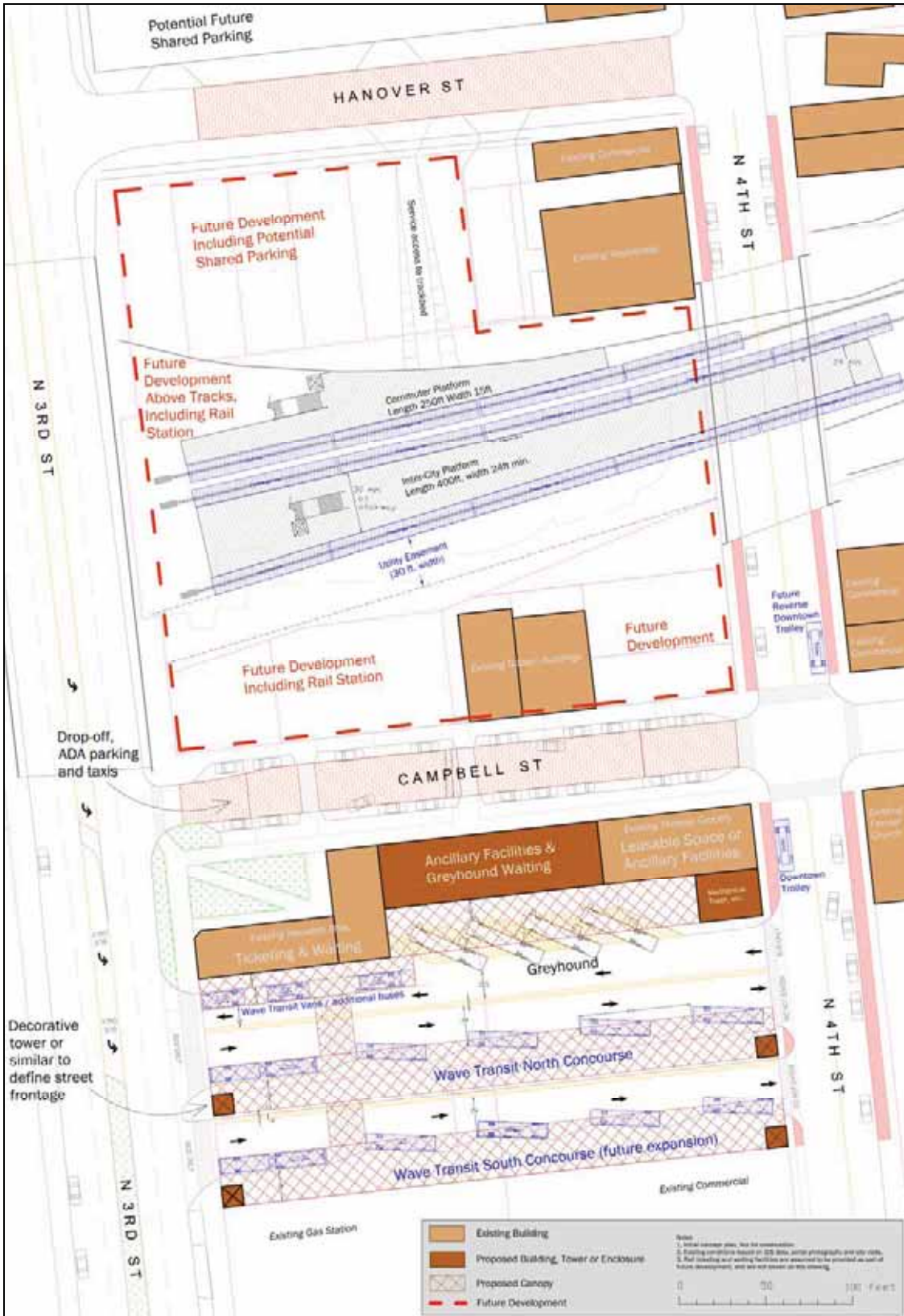
Campbell Street would be the subject of a full streetscape plan, recognizing its multiple roles: as the main point of arrival/departure for riders, as a historic street, and as the street serving future development on the north side. To accommodate the expected traffic patterns, on-street parking bays would be created in place of the current grass buffers. These would be used for drop-off and pick-up (short-stay parking), a taxi stand, and accessible (ADA) parking. Additional parking space would also be available on North 4th Street. The brick surface would likely be restored on top of a new base, as has successfully been done for similar streets in Wilmington. The current concrete area in front of the Neuwirth building would be re-landscaped to provide a focal point, visible from North 3rd Street.

North of Campbell Street, almost the entire NCDOT-owned property would be available for future development, possibly as a public-private partnership (PPP). This would likely include a strong building frontage on North 3rd Street, similar to the office buildings recently constructed on that street. Frontages on Hanover Street and Campbell Street (possibly also at the 4th Street bridge) would likely reflect the character of those streets. Rail facilities (ticketing, waiting, etc.) would likely be provided at street level within that development. The north-west corner of the block, fronting Hanover Street, is suitable for a small parking deck, which could be used in part for rail passengers’ parking. Service access to the trackbed would be through this development, from Hanover Street.

The rail platforms would be below street level, at a similar level to the current parking lot. The utility easement and the North 4th Street bridge restrict the geometry here. Nevertheless, it is possible to accommodate three platform tracks with ample platform dimensions. This includes two long platforms for inter-city or commuter trains (at least 400 feet, accommodating trains with four cars plus a locomotive) and a shorter platform for commuter trains (250 feet, accommodating trains with three cars plus a locomotive in push-pull formation). The generous platform widths allow flexibility in coordinating the stairs and elevators between the building and the platforms.

The corner of North 3rd Street and Campbell Street, on this block, would be a focal point. It is where the rail facilities and the bus facilities would meet (either side of Campbell Street), and it is where they would connect to a future pedestrian tunnel under North 3rd Street to the CFCC campus and the waterfront. This pedestrian link would form part of the trail proposed in the Downtown Plan.

Figure 7.1 Recommended Site Layout



Concept plan. Not for construction.

7.3.1 Building Space Estimates

An initial phase of the WMTC, serving Wave Transit and Greyhound but not rail, would likely use the two parts of the Neuwirth building and the new concourse building for its indoor facilities. The available space consists of 4,200 sq ft (total) in the two parts of the Neuwirth building, and 4,750 sq ft per level in the new concourse building.

The internal layout of the WMTC buildings is beyond the scope of this study. However, Table 7.2 compares the space needed for an initial phase of the WMTC, serving Wave Transit and Greyhound but not rail, with the space available. The various functions have been tentatively allocated to the most suitable building spaces, although this is simply a reality-check and does not represent a space-planning design or decision. The table confirms that the required functions can indeed be accommodated in these buildings (assuming that the bicycle station is housed in an adjoining building such as the Thomas Grocery building).

7.3.2 Other Development Opportunities

The Thomas Grocery building has approximately 3,500 sq ft on each of two levels, and could serve non-transit uses or could become an extension to the WMTC space if required.

Rail facilities (ticketing, baggage, waiting and employee offices) would be provided as part of future development north of Campbell Street. This site, as outlined on Figure 7.1, has an area of approximately 2.1 acres or 90,000 sq ft. The rail facilities are estimated to require approximately 9,000 sq ft, or 10% of the site area.

The zoning rules require a minimum building height of 36 feet on the western and central parts of the 'future development' site (representing approximately three stories over 1.6 acres) and 24 feet on the eastern part of the site (representing approximately two stories over 0.5 acres). If the entire site area were developed to these minimum heights, a total of approximately 250,000 sq ft could be built. In practice, development would likely be higher (recent developments on North 3rd Street have been around five stories) but would probably not use the entire footprint. The actual development could still be 250,000 sq ft or more.

The two G. Stein buildings on Campbell Street, which are contributing structures and are assumed to be retained, have a total of approximately 4,400 sq ft.

Table 7.1: Comparison of Development Opportunities

		Slab Option (Sketch 14)	U-Haul Option (Recommended option)
Railbed site	Total site area	2.1 acres (90,000 sq ft)	2.1 acres (90,000 sq ft)
	Likely buildable area	45,000 sq ft or less	53,000 sq ft or more
	Likely quality of building footprint	Varies. Limited depth on N 3rd St because combination of bus circulation and tracks makes column placement difficult. Corner buildings have good footprint.	Good. Potential depth 80ft or more on 3rd St. Corner buildings are also good.
	First floor street frontage	635 feet (Hanover Street frontage is occupied by driveways)	850 feet
	Option to build parking deck as part of development?	Not realistic (difficult to provide vehicle access)	Yes – vehicle access from Hanover Street, good footprint available
	Additional issues	Some large spans required over bus bays alongside Hanover Street. Ground floor at N 3rd St over tracks may have to be elevated slightly to clear trains.	Ground floor at 3rd St over tracks may have to be elevated slightly to clear trains.
U-Haul site	Total site area	1.0 acres (44,000 sq ft)	1.0 acres (44,000 sq ft)
	Probable buildable area	Entire site (44,000 sq ft)	Up to about 34,000 sq ft (Greyhound bays make column placement difficult in that area)
	Likely quality of building footprint	Good – full site available	Poor - awkward shape with limited opportunities for core areas (elevators, systems, etc) and street access.
	First floor street frontage	260 feet	70 feet, split among small locations
	Option to build parking deck on site?	Yes – vehicle access from N 3rd St and N 4th St. Excellent footprint.	Not realistic (footprint limited by bus circulation requirements, vehicle access has to be from an adjoining parcel)

All figures are approximate. This table represents an initial comparison of the two options, rather than a full feasibility assessment.

Table 7.2: Summary of Building Space Needed and Available (Initial Phase)

Step 1: Available building space	Step 2: Transit space needed (see note 1.)	Step 3: Possible Allocation of Functions to Buildings (see note 2.)
Neuwirth Bros (3rd St building) 2,250 Neuwirth Bros (Campbell St building) 1,950 New Building on Campbell St - First floor 4,750 New Building on Campbell St - Second floor 2,375 (see note 6)	Wave Transit 1,500 Wave waiting 325 Wave ticketing and staff facilities 1,825 Total 3,650	Neuwirth Bros (3rd St building) 1,500 Subtotal 1,500 Other (see note 3) 750 Total 2,250 (33% of building)
	Greyhound Ticketing/baggage/ staff 795 Waiting 736 Total 1,531	Neuwirth Bros (Campbell St building) 325 Wave ticketing and staff facilities 800 Restrooms 1,125 Other (see note 3) 825 Total 1,950 (42% of building)
	Shared 800 Restrooms (no rail so smaller) 300 Office/kiosk space (taxi etc) 100 Visitor kiosk 1,000 Food/retail 550 Building management 750 Bicycle station 3,500 Total 6,956	New Building on Campbell St - First floor 795 Greyhound ticketing/baggage/ staff facilities 1,500 Greyhound waiting (see note 4) 300 Office/ kiosk 100 Visitor kiosk 1,000 Food/retail 550 Subtotal 3,695 Other (see note 3) 1,055 Total 4,750 (22% of building)
		New Building on Campbell St - Second floor (see note 6) 550 Building management 1,000 Unassigned space (see note 5) 1,550 Subtotal 3,100 Other (see note 3) 825 Total 3,925 (35% of building)
Grand total	Grand total	Grand total
11,325	6,956	11,325
		Bike station in Thomas Grocery

Notes:

- The transit space estimates are based on the table presented earlier in this report. However, the figures have been split differently to reflect the fact that the rail facilities are in a separate building in the final recommended site plan.
- This allocation of functions does not represent a full interior design and layout. It is simply a 'reality check' to ensure that the available building space can sensibly accommodate the transit needs. The allocation is indicative and reflects the adjacencies that each function requires.
- 'Other' is remaining space that can be used for circulation areas, lobbies, mechanical spaces, stairwells, etc.
- It is assumed that the southern edge of the building will be mainly devoted to a strip of Greyhound waiting, alongside the buses, similar to airport gates. This results in more waiting space being potentially available than the specification requires.
- Additional space is available and could be used for expansion of offices, police facilities, or a private or public conference room.
- It is assumed that the upper level of the new building only extends for approximately half of the building footprint. The remainder of the footprint would be a double-height waiting or lobby area.

8 Recommendations and Next Steps

With this study, the City of Wilmington, Wave Transit, NCDOT Rail Division and NCDOT Public Transportation Division are asked to approve the recommended site layout as the basis for design.

The City is asked to commit to purchase of the U-Haul site and to provide the 10% local match.

If these recommendations are accepted, the next steps are for NCDOT, working with the City and Wave Transit, to:

- Make the purchase, through agreement or condemnation.
- Undertake initial site preparation, including removal of unwanted buildings and other clean-up tasks.
- Begin identifying potential funding sources for an initial phase that provides the bus facilities and enhances Campbell Street.
- Take the design process to the next level of detail.

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Appendix 1: Functional Requirements Identified in the 2000 Study

The following text is an extract from the Feasibility Study undertaken in 2000. Only the requirements related to transportation functions are listed here. The 2000 study also incorporated requirements from Cape Fear Community College and the Wilmington Railroad Museum, as these organizations were anticipated to be part of the development.

4.2.1 Transportation Functions

A Multi-modal Transportation Center is, as the name implies, a focal point at which many modes of transportation converge to provide economical and efficient service to popular destinations. For this report as many of the possible transportation modes available to the Wilmington Urban Area are presented with rail being the primary mode for analysis due to its fixed routing. It should also be noted that ridership for transit and rail is dependent upon the location of the bus terminal and rail station

Passenger Rail

All rail station requirements assume that the initial Wilmington rail travel patterns will be similar to that projected for the downtown Durham, NC Intrastate Rail Scenario (from a minimum of 177,000 passengers to approximately 312,000 passengers boarding and alighting per year). The Durham Intrastate Rail Scenario is taken from Railroad Station Study, Piedmont High Speed Corridor, Appendix – Space Requirements for PHSC Stations, Final Report for NC DOT – Rail Division, February 26, 1997. There are no similar rail passenger forecasts for suburban or rural rail stations in the study.

NCDOT recommends a minimum of a 3,000 square foot lobby for 200 to 300 people. A common waiting area with other tenants has also been requested. NCDOT recommends that the ticketing office be approximately 16 feet by 30 feet (480 sq. ft) and that the three ticket windows be built with removable bulletproof glass. The total is 3,480 square feet.

NCDOT Rail Division requires a baggage/express package room that is at least 20 feet by 30 feet (600 sq. ft). This room should have roll-up doors and access to the platform. The room will also house a “golf cart” type vehicle for moving baggage. A first class mail lock-up should be provided next to the baggage room with a window. The lock-up room should be 16 feet by 20 feet (320 sq. ft) and can be a fenced-in area within the larger space. This requires a total of 920 square feet.

NCDOT Rail Division requires an office for the lead agent that is 16 feet by 16 feet (256 sq. ft). A break room that is 16 feet by 20 feet (320 sq. ft) should also be provided. The break room will have enough space for 20 lockers and can also be used as a conference room. Operations space includes 100 sq. ft per employee with four employees projected (400 sq. ft). This is a total of 976 square feet.

The desired minimum width for passenger platforms is 20 feet. The single platform (for two tracks) is desirably 800 feet in length for a total of 16,000 square feet (estimate does not include track or right-of-way width requirements). The platform should be covered to protect the passengers from the elements.

NCDOT recommends that there be 175 parking spaces for vehicles. Of these, 75 are assigned as long-term parking and 75 for short-term parking with the remainder (25) for rail staff and operations vehicles. Long term passenger parking spaces should be located within a three to four minute (or approximately 800 foot) walk from the rail platform.

Trailways/Greyhound Intercity Bus Services

The bus station requirements are from the Trailways staff. They anticipate enough ridership to necessitate four bus loading “tracks” for their future downtown Wilmington operations.

It is estimated that 736 square feet be provided for the intercity bus passenger waiting area. It has also been recommended that 30 seats be provided in that area. Trailways prefers to share its waiting space with other tenants. It is estimated that 180 square feet will be sufficient to accommodate intercity bus ticketing operations. This provides for two passenger ticket windows with two sell positions and one express package window. The

ticket office should have a good visual connection with the passenger lobby and the intercity bus parking area. Total is 916 square feet.

It is estimated that 286 square feet will be needed for baggage and package handling and storage. This area requires direct access (as the packages can weight up to 100 pounds) to two parking spaces specifically reserved for package express vehicles. Trailways also requires that there be 72 square feet of secured storage. Total storage is 358 square feet.

It is estimated that one, 9 foot by 12 foot (or 108 sq. ft.), office will be sufficient for intercity bus operations with a 6 foot by 11 foot (66 sq. ft) drivers room located in the rear of the baggage room. No separate staff restroom requirement is anticipated. Total office space then is 174 square feet.

Trailways has indicated that four bus loading bays (14 ft. x 45 ft.) will be sufficient. Three additional bus parking spaces are needed for bus parking/layovers for a total of seven bus parking spaces. The bays should be adjacent to the intercity bus passenger waiting area and readily accessible from the baggage storage area. If located outside, they should have a canopy to provide shelter for passengers embarking and disembarking.

Trailways has indicated that 20 short-term vehicle parking spaces are needed for customers. They also require four spaces for employees and two spaces for express package handling and delivery near the baggage room area for a total of 26 vehicle parking spaces.

Wilmington Transit Authority (WTA)/New Hanover County Transportation Services

These systems are in the initial planning stages to merge into one transit system. One of the operational strategies for service provision being considered at this time by the WTA that will impact the space requirements of a proposed Multi-modal Transportation Center is modifying their service structure to a “mini-hub” transit system. A “mini-hub” system in one in which there are multiple transfer centers located at various key transit route junctions in the greater urban area. The City of Wilmington is considering the “mini-hub” system because the WTA is planning service expansion to areas being annexed.

Anticipated future bus station requirements are provided by WTA staff. They anticipate that their future downtown ridership will require approximately 10 bus loading “bays” for downtown bus transfer operations. Bus station requirements for the New Hanover County Transportation Services paratransit system is much harder to estimate due to it being a demand response system.

WTA staff estimates that 1,050 square feet will need to be provided for the local bus passenger waiting area. They also estimate that 100 square feet should be sufficient for their ticketing operations. WTA staff also anticipates that the peak passenger demand lobby space would need to accommodate, at a maximum, 50 to 60 people. It is estimated that WTA will require one (15 ft. x 15 ft.) office for staff and storage at 225 square feet.

The number of local bus bays is a function of the number of bus routes that will converge on the center during peak periods. At this time WTA estimates that ten bus bays should be sufficient to accommodate WTA buses during peak periods. The platforms should be covered to protect the passengers.

Bus station requirements from the New Hanover County Transportation Services staff indicate that they will need to have approximately 1,600 square feet of office space for at least three full-time employees. No separate staff restroom requirement is anticipated.

New Hanover County Transportation Services staff have estimated that five paratransit vans should be sufficient upon the opening of the Center. This assumes having a maintenance facility for the overnight parking of the remainder of their fleet elsewhere and also having other “mini-hub” stations and transfer center with which to operate their service. Five parking spaces will be sufficient for employees for both WTA and the New Hanover County Transportation Service.

Pedestrians, Bicycles, Taxis, Hotel Courtesy Vans, and Trolleys

The anticipated traffic by these modes of travel will be heavily dependent upon the nature and type of existing and future development in the vicinity of the multi-modal center. The types of planned development that will generate significant amounts of this type of traffic include; downtown convention centers, restaurants, tourist attractions and hotels. The amount of internal space required by these modes of travel can be accommodated by the design of the transportation center.

A minimum of six reserved taxi parking spaces that are clearly visible to arriving intercity bus and rail passengers should be as per Port City Taxi staff. A “curb loading lane” should be provided to accommodate courtesy van and trolley service per the chair of the Cape Fear Coastal Convention & Visitors Bureau.

Bicycle lockers should be provided on site. The number of bike lockers should be determined in consultation with city staff and neighborhood organizations. A minimum of six bike lockers and a single bike rack should be provided initially, with an area for more lockers and racks to be added as demand indicates expansion requirements. The lockers and racks should be located in a covered and highly visible area. Depending upon the popularity of bicycle transportation and recreation in Wilmington at the time the final design is being developed for the Wilmington Multi-modal Center, it may be that a “bike station” area should be programmed into the Center’s space functions. A bike station can provide “valet service” to bike commuters and would also provide bicycle rentals for tourists.

Security

One office (81 sq. ft) for on-site security personnel should be sufficient. The security personnel office will also house video-monitoring equipment.

Restrooms

Public restrooms (1,670 sq. ft.) should be provided for all users of the Multi-modal Transportation Center. There should be 12 stalls provided for women and five stalls for men with an additional seven urinals. Total restroom square footage is 3,220.

NCDOT Rail Division requests that separate employee restrooms be provided. The location of these restrooms should be behind the passenger rail ticketing counter. NCDOT Rail Division requests 1,000 square feet for a women’s restroom and 550 square feet for a men’s restroom, for a total of 1,550 square feet of separate employee restrooms.

Miscellaneous

A bank of telephones (the actual number to be determined by the phone company) should be included in the design. Vending machines should be provided regardless of whether or not other food services are present. Lockers and an automatic teller machine should also be included in the waiting area.

Space Summary

The combination of the space calculations is presented in Tables 1, 2 and 3. This data represents an initial estimate of needs based on statements of the transportation operators. The design process that combines the indoor space in one or more buildings and the outdoor space on the site may result in a different quantity of space. The exterior land space may be met with less area due to the layering of floors in a multi level design. Similarly, the land footprint for interior space can be reduced with the sharing of common areas by the transportation modes and by multi-level buildings.

Table 1. Multi-modal, Multi-use Transportation Center Building Space Requirements*

Use	Internal Area	External Area	Total Area
Passenger Rail	5,376	77,250	82,626
Trailways\Greyhound	1,448	13,510	14,958
WTA\New Hanover TS	2,975	TBD	2,975
Ped, Bike, Taxi, Trolleys, etc.	N/A	TBD	TBD
Restrooms & Security	4,851	N/A	4,851
Cumulative TOTAL	14,650	90,760	105,410

*Square footage includes the information listed in Tables 2 and 3

Table 2. Car Parking Requirements

Use	Taxi	WTA	Trailways/ Greyhound	Rail	Total
Short Term Parking	6	0	20	75	101
Long Term Parking	0	0	0	75	75
Loading/ Employee	0	5	6	25	42
Total Vehicles	6	5	26	175	218
Total Square Feet*	2,100	1,750	9,100	61,250	74,200

*Assumes 350 sq. ft per parking space.

Table 3. Number of Vehicles (by Type) to be Accommodated On-Site

Type of Vehicle	Trolley	Taxi	WTA	New Hanover	Trailways\ Greyhound	Rail
Number of Vehicles (square feet)	2 * (1,080)	6 cabs (2,100)	10 bus (5,400)	5 Vans (2,250)	7 bus (4,410)	2 trains (16,000)

*Estimate to be confirmed.

Total estimated space needed for transportation vehicles is 30,610.

Appendix 2: Concept Plan for 3rd St / 4th St Site in the 2000 Study

The following text is an extract from the Feasibility Study undertaken in 2000.

A conceptual site layout showing potential locations for the various transportation uses has been developed for the initial alternative site between Campbell and Hanover Streets (see [diagram below]). The concept features two basic levels, the track level and the street level. The rail tracks and platforms are located at the track level, while both the WTA and intercity bus operations are located on a large concrete deck to span between the two bridges on 3rd and 4th Streets. Bus access is from both 3rd and 4th Streets. The location of parking has not been designated on the plan but could occupy the junked vehicle area north of Hanover Street.

An expanded 3rd to 4th Street site would include the blocks between Campbell and Brunswick Streets. This area currently has a tier of lots facing Hanover, 4th and Brunswick Streets. Residences and small businesses occupy the lots. The 3rd Street frontage and the interior of the block are used for a junked vehicle storage yard. Based on discussions with Steering Committee members there has been discussion about the redevelopment of a portion of the block. A supermarket to serve the nearby residences and the downtown community has been mentioned as a potential new occupant of the block.

A plan for the expanded site between Campbell and Brunswick has not been prepared; however, the changes can be estimated. It is likely the bus deck between 3rd and 4th Streets on the Campbell/Hanover site would be replaced by a surface bus handling area occupying the area now used for junked vehicles north of Hanover. The train platform would remain in the same location under both options between Campbell and Hanover. Hanover Street would then be the centroid of the Campbell/Brunswick multi-modal center with the bus to the north and the train to the south. Due to the light traffic on Hanover, the street should function without too much friction from general traffic. One option would be to close Hanover Street to through traffic and incorporate the brick paved area into the center's design.

The Campbell/Brunswick layout would see a combined bus building located north of Hanover Street to serve the WTA and intercity buses. The rail service center would probably be located on the south side of Hanover Street with stair and elevator access to the lower track/platform level. The accompanying plan view shows the arrangement for the Campbell/Hanover site that had the intercity bus on the south side of Hanover and the combined WTA and rail service center on Campbell Street. Parking for the Campbell/Brunswick may not fit on the block north of Hanover due to the bus handling area. Another nearby location may have to be found like the combined use of the CFCC's lot east of 3rd Street.

A major issue with either option for the 3rd to 4th Street site is the layout of the rail tracks and platform(s). The desired minimum width for passenger platforms is 20 feet. A minimum of approximately 10 feet is required to accommodate each track and the train using it, therefore the combined width of two tracks and single platform is 40 feet. The desirable platform length is 800 feet (700 feet is the minimum).

A stone retaining wall follows a path in an east by northeast direction on the south side of the train level. The wall is considered to be historic, perhaps dating to the Civil War era. Because of the stone retaining wall, the tracks and platform must be located on the upper portion of the train level part of the site at an elevation of about 29 feet. The clearance under the Fourth Street Bridge, between the abutment on the north side and the retaining wall (but excluding the retaining wall) is less than 40 feet (approximately 35 feet in the center of the bridge).

Therefore, the platform cannot begin until the approaching tracks are west of the Fourth Street Bridge (estimated to be approximately 50 feet west of the bridge to allow the tracks to split to accommodate a 20-wide platform). To achieve even the minimum platform length (650 to 700 feet), the tracks and platform would have to protrude at least 250 to 300 feet into the CFCC parking lot behind the Schwartz Center.

The concept plan demonstrates that the site can only accommodate the required transportation functions if the tracks can extend into the CFCC parking lot. (Given the preliminary nature of the analysis, not all other functional details have been confirmed, e.g., mail truck access to the platform that would have to occur via the CFCC parking lot).

Both development options at the 3rd to 4th Street location would probably result in the need to move the historic cottages on Hanover Street. The building to the east of the cottages would also probably be

Appendix 3: Functional Requirements Identified in the 2004 Study

The following text is an extract from the Site Evaluation Study undertaken in 2004.

6.1 Determination of Physical Requirements

The physical requirement for the site includes both internal and external space. Depending upon the final site chosen and the final number of transportation modes involved in the center, the total maximum site space requirements could potentially be reduced by combining common areas such as lobby space, hallways and restrooms.

Primary requirements for areas outside the building would be rail platforms, tracks, bus loading operations, car parking (long and short term), parking (passenger, buses, taxis, employees), and circulation for vehicles, bicycles and pedestrians. Some of the outside area must also be allocated for landscaping depending upon the layout of the site. This report excludes the amount of area needed for the circulation of vehicles and pedestrians, as they are often a function of the building's design and its relationship to the public rights-of-way. In addition, the total land requirements for each site may vary depending upon the provision of multi-level structures as part of the design.

In addition, it is possible to co-locate non-transportation functions within the multi-modal transportation center. These could include office, retail and public uses. No matter what conceptual plans are developed for a multi-modal transportation center at this time, they should be made with provisions for accommodating growth in service by each transportation mode and in public services specific to the Wilmington Urban Area.

This report assumes that rail is the primary transportation mode around which other transportation modes and non-transportation uses will be analyzed to determine the feasibility of combining some or all in one facility. Intra-city rail service is bound to the proximate use of railroad tracks that have very clear limits for their location and connection to the rail network linking Wilmington to the rest of North Carolina. The bus mode, on the other hand, has a considerable degree of flexibility in its circulation being bound to an extensive street network of adequate size to accommodate the vehicles. Therefore, the siting of the WMMTC will be heavily dependent upon the location impacts to the ridership for each mode, especially rail. This is because a transportation facility's feasibility, and therefore funding, is dependent upon the ridership/usage forecasts for the proposed facility.

The following sub-section addresses the space requirements for each travel mode and related facilities. Note that the 2000 Feasibility Study was utilized as a primary source for identifying spacing requirements. The estimates from this report were adjusted slightly as shown in the text, however. Note that all design elements must be consistent with the American Disabilities Act and Homeland Security Act requirements.

6.1.1 Passenger Rail

The primary requirements for space requirements for rail (and other transportation facilities) must be tied to projections for anticipated usage of the system. As part of the 2000 Feasibility Study, no projections were available for forecasting the passenger ridership for a Wilmington station. Therefore, the 2000 Feasibility Study assumed that the initial Wilmington rail travel patterns will be similar to that projected for the downtown Durham, NC Intrastate Rail Scenario. This reflected a forecast of between 177,000 passengers to approximately 312,000 passengers boarding and alighting per year. (Railroad Station Study, Piedmont High Speed Corridor, Appendix – Space Requirements for PHSC Stations, Final Report for NC DOT – Rail Division, February 26, 1997.)

Since the release of the 2000 Feasibility Study, NCDOT released the Southeastern North Carolina Passenger Rail Feasibility Study which developed projection for rail ridership to Wilmington. The estimate for the route with the highest ridership projections was a total of 43,700 passengers for the Wilmington station (Technical Report, May 2001, p. 2). This is approximately 25 percent of the Durham projections. Based on this comparison, some preliminary adjustments were made in cooperation with the NCDOT Rail Division to identify space requirements for passenger rail as reflected below.

The 2000 Feasibility Study included a recommendation of a minimum 3,000 square foot lobby for 200 to 300 people. Given the reduction in projected riders, NCDOT suggested that the lobby could be conservatively be reduced by 50 percent to 1,500 square feet. It is recommended that the public waiting area be shared with both

the intercity bus and transit lobby for the WMMTC. For this reason, the waiting area square footage is further refined in Section 6.1.5 and is not included in the total for this section.

As suggested by the NCDOT Rail Division, a ticketing office sized approximately 16 feet by 30 feet (480 sq. ft) with three ticket windows and removable bulletproof glass is recommended. The total space requirement is 1,980 square feet. Other operational requirements include a baggage/express package room that is at least 20 feet by 30 feet (600 sq. ft). This room should have roll-up doors, access to the platform, and will house a “golf cart” type vehicle for moving baggage. A first class mail lock-up should be provided next to the baggage room with a window. The lock-up room should be 16 feet by 20 feet (320 sq. ft) and can be a fenced-in area within the larger space. The ticketing and baggage facilities require a total of 1,400 square feet.

NCDOT Rail Division requires an office for the lead agent that is 16 feet by 16 feet (256 sq. ft). A break room that is 16 feet by 20 feet (320 sq. ft) should also be provided. The break room will have enough space for 20 lockers and can also be used as a conference room. Additional operations space includes 100 sq. ft per employee with four employees projected (400 sq. ft). This is a total of 976 square feet.

Area	square feet
Ticketing	480
Baggage & Packaging	920
Manager's Office	256
Break Room	320
Operations Space	400
Total	2,376*

* The space requirements do not include the waiting area or restrooms which are summarized in Sections 6.1.5 and 6.1.7.

The railroad platform will be one of the major features driving the layout of the site. Based on discussions with NCDOT, a 600-foot long platform would be adequate for all foreseeable future operations. Maintaining the desired 20-foot width for this platform produces a total of 12,000 square feet. Note that this is a reduction from the 800-foot platform identified in previous studies. Note that the shorter length could also substantially reduce impacts to adjacent sites if a longer platform were required to extend beyond the limits of the preferred site. Note that the square footage estimate does not include track or right-of-way width requirements. The platform should be covered to protect the passengers from the elements.

NCDOT has recommended the inclusion of 150 parking spaces for all vehicles utilizing the WMMTC from all modes of travel including rail, intercity bus, and transit. Of these, 50 percent would be assigned for long-term passenger parking and 50 percent for combined short-term passenger and employee parking. For purposes of the calculations included in Table 4, it was assumed that this would correspond to 130 spaces for rail passengers. The remainder of the spaces were identified in the table for specific modes. Regardless, the total passenger parking spaces for all modes equals exceeds 150 spaces.

Note that long term passenger parking spaces should be located within a three to four minute (or approximately 800 foot) walk from the rail platform. It was pointed out that the original design may be reduced to 100 parking spaces with allowances for expansion. In determining parking spaces for passenger rail, allowances are provided for holiday peaks.

6.1.2 Trailways/Greyhound Intercity Bus Services

The bus station requirements are from the Trailways staff. They anticipate enough ridership to necessitate four bus loading “tracks” for their future downtown Wilmington operations. As shown in Section 3.2.6, there are currently 5 Greyhound routes leaving and five Greyhound routes arriving in Wilmington daily. Updates to the intercity bus operation specifications portion of the 2000 Feasibility Study were based upon an interview with Trailways as documented in Appendix B.

In terms of space requirements, four covered tracks would be needed for Trailways buses, although three might be sufficient if space is constrained. Facilities are not only acceptable to be shared with rail, but it is actually preferred since it makes the facility more efficient and use less space (citing Williamsburg, Wilson, and Durham as examples). Since Wilmington is a terminus, no refueling or dumping facilities would be required. The bays should be adjacent to the intercity bus passenger waiting area and readily accessible from the baggage storage

area. If located outside, they should have a canopy to provide shelter for passengers embarking and disembarking.

The waiting area needs seating for 30 people. Overall, about 1,450 square feet is needed, all of it on the ground floor of the facility. It is recommended that the public waiting area be shared with both the rail and transit components of the WMMTC. For this reason, the waiting area square footage is further refined in Section 6.1.5 and is not included in the total for this section.

Area*	square feet
Manager's Office	108
Storage Locker	76
Driver's Waiting Area	66
Ticketing	180
Baggage & Packaging	290
Total	720*

* The space requirements do not include the waiting area or restrooms which are summarized in Sections 6.1.5 and 6.1.7.

Parking requirements for Trailways operations are: 20 spaces for short-term parking and six more for employees and loading/unloading passengers under a 15' canopy. The canopy should be deep enough to provide shelter for loading/unloading the bus baggage compartments.

6.1.3 Cape Fear Public Transportation Authority

Since the 2000 Feasibility Study was released, the Wilmington Transit Authority (WTA) expanded to become the Cape Fear Public Transit Authority (CFPTA) with the New Hanover Transportation Services (NHTS) merging into the expanded authority. This organization is independent of local government, and is currently in the process of obtaining its Designated Recipient status from FTA. CFPTA will own and operate the entire public transit system. The current fiscal year operating budget is approximately \$4.5 million; the total budget is \$13 million accounting for capital facility acquisition. An interview was held with Albert Eby, the Transit Director, to determine changes in anticipated space requirements.

In general, it is estimated that a downtown transfer center would have as many as 16 vehicles entering/exiting the site in a one-hour period: four fixed routes on 30-minute headways; two trolleys on 20-minute headways; and an airport shuttle vehicle on 30-minute headways. These figures are based on the recently-released short-range transit plan. To support the future plan, no change is estimated from the 2000 Feasibility Study that identified parking requirements for seven buses and three trolleys/shuttle vehicles would be required. Five auto parking spaces will be sufficient for employees for CFPTA.

Based upon the 2000 Feasibility Study, building requirements would include:

Area*	square feet
Staff Office	1,825
Ticketing	100
Total	1,925

* The space requirements do not include the waiting area or restrooms which are summarized in Sections 6.1.5 and 6.1.7.

6.1.4 Pedestrians, Bicycles, Taxis, Hotel Courtesy Vans, and Trolleys

The anticipated traffic by these modes of travel will be heavily dependent upon the nature and type of existing and future development in the vicinity of the multi-modal center. The types of planned development that will generate significant amounts of this type of traffic include; downtown convention centers, restaurants, tourist attractions and hotels. The amount of internal space required by these modes of travel can be accommodated by the design of the transportation center.

A minimum of six reserved taxi parking spaces that are clearly visible to arriving intercity bus and rail passengers should be provided as per Port City Taxi staff. A "curb loading lane" should be provided to

accommodate courtesy van and trolley service per the chair of the Cape Fear Coastal Convention & Visitors Bureau.

Provision should be made for a minimum of six open-cage bicycle lockers and one bicycle rack at time of opening with room for additional expansion if required. Consideration of integrating a “bike station” area into the plan should be made depending upon the popularity of bicycle transportation and recreation in Wilmington at the time the final design is being developed. A bike station can provide “valet service” to bike commuters and would also provide bicycle rentals for tourists.

6.1.5 Shared Waiting Areas

As noted in Sections 6.1.1, 6.1.2, and 6.1.3, waiting areas or lobbies are required for passenger rail, intercity bus, and public transportation. The waiting areas can be shared between passenger rail and intercity bus patrons. Sharing this space allows increased flexibility in design as well as the ability to reduce the overall space requirements by taking advantage of differences in traffic patterns for each facility. It is estimated that a shared use facility could reduce total waiting requirements by up to 30 percent. Using this reduction factor, total square footage required for passenger rail and intercity bus patrons is estimated to be 1,600 square feet. Note that Amtrak prefers that bus and rail ticket counters and baggage counters are independent.

A separate waiting area is typically provided for City transit customers. Amtrak also prefers a separate waiting area for its intercity rail passengers from intercity bus passengers. It is estimated that the waiting area for public transportation will be approximately 1,050 square feet. In addition to the indoor waiting area, canopies are recommended over the city bus platforms to provide some shelter while boarding.

Area	square feet
Passenger Rail	1,500
Intercity Bus	736
	2,236
Shared Total (70%)	1,600
Public Transportation	1,050
Overall Total	2,650

As shown above, the two waiting areas were estimated to be 2,650 square feet utilizing the space requirements identified for the passenger rail/intercity bus waiting area and the public transportation waiting area.

6.1.6 Security

One office (81 sq. ft) for on-site security personnel should be sufficient for all anticipated uses. The security personnel office will also house video-monitoring equipment. It is assumed that security personnel would utilize the public restrooms.

Note that a potential amenity for consideration could be the inclusion of regular police substation. If provided, this facility could require approximately 625 square feet. This facility is not included in the summary data, but could be added if deemed appropriate.

6.1.7 Restrooms

For the WMMTC, both employee restrooms and public restrooms will be required. Public restrooms should be provided as part of the Multi-modal Transportation Center. As a result of labor requirements, separate employee restrooms are required for the passenger rail, intercity bus, and public transportation employees.

For each group of employees a single stall unisex restroom of approximately 75 square feet will be provided. The location of these restrooms should be behind the offices or ticket counters separated from the general public. Total employee restroom square footage is 225 square feet.

The public restrooms will be separate men’s and women’s facilities with approximately 550 square feet for each. Total public restroom square footage is 1,100 square feet.

Area	square feet
Public Restrooms	1,100
Rail employees	75
Bus employees	75
Transit employees	75
Total	1,325

6.1.8 Miscellaneous

A bank of telephones (the actual number to be determined by the phone company) should be included in the design. Vending machines should be provided regardless of whether or not other food services are present. An automatic teller machine should also be included in the waiting area.

In addition to the passenger rail, intercity bus, and transit connection, it may be desirable to include a satellite office for a rental car into the site design. Since the inclusion of such a facility would include cooperation and commitments from a private entity, no formal space requirements have been identified. In general, it is estimated that an office area would be required with room for storing a limited number of cars. Since this would be a satellite location, it is assumed that maintenance, repairs, and storage of vehicles would occur off the WMMTC site. This facility is not included in the summary data, but could be added if deemed appropriate.

6.1.9 Space Summary

The combination of the space calculations is presented in Tables 3, 4, and 5. This data represents an initial estimate of needs based on statements of the transportation operators. The design process that combines the indoor space in one or more buildings and the outdoor space on the site may result in a different quantity of space. The exterior land space may be met with less area due to the layering of floors in a multi level design. Similarly, the land footprint for interior space can be reduced with the sharing of common areas by the transportation modes and by multi-level buildings.

Table 3. Wilmington Multi-Modal Transportation Center Building Space Requirements (square feet)¹

Use	Internal Area	External Area	Total Area
Passenger Rail	2,376	57,500	59,876
Trailways \ Greyhound	720	13,500	14,220
CFPTA Fixed Route Transit Service	1,925	10,380	12,305
Pedestrian, Bicycle, Taxi, Trolleys	None	3,600	3,600
Waiting Area	2,650	None	2,300
Security	81	None	81
Restrooms	1,325	None	1,325
TOTAL	9,077	84,980	94,057

Source: Modified from Multi-Modal Transportation Center Feasibility Study (May, 2000)

Note: Does not include square footage from additional services such as Police Substation (625 sq. ft.) or Rental Car satellite office.

Table 4. Car Parking Requirements²

Use	Taxi	CFPTA Transit	Trailways/ Greyhound	Rail	Total
Short-Term Parking	6	0	20	65	86
Long-Term Parking	0	0	0	65	65
Loading and Employee	0	5	6	0	42
Total Vehicles	6	5	26	130	218
Total Square Feet*	2,100	1,750	9,100	45,500	58,450

Source: Modified from Multi-Modal Transportation Center Feasibility Study (May, 2000)

Table 5. Number of Vehicles (by Type) to be Accommodated On-Site³

Type of Vehicle	Taxi	CFPTA Transit	Trailways \ Greyhound	Rail	Total
Number of Vehicles (square feet)	4 cabs (1,500)	7 35'-40' buses and 3 trolleys/ shuttle vehicles (8,630)	4 bus (4,400)	2 trains (12,000)	20 vehicles (30,540)

Source: Modified from Multi-Modal Transportation Center Feasibility Study (May, 2000)

¹ Square footage includes the information listed in Tables 2 and 3. Note that passenger waiting, baggage and ticketing areas can be jointly used by rail and intercity bus patrons.

² Assumes 350 sq. ft per parking space.

³ Maximum Daily Loading Requirements at Peak Hour.

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Appendix 4: Site Analysis for Relevant Sites in the 2004 Study

Site #5: 3rd and 4th Street Site (South of Railbed)	
<p>Land Area: 2.7 acres</p> <p>Walking Distance to Convention Center: 1,400 feet via RR Bed 2,200 feet via Harover 1,800 feet via Red Cross</p> <p>Description of Property and Ownership: This site is located south of the existing railroad bed between Third and Fourth Street. It is made up of two separate parcels divided by Campbell Street, both located south of the existing RR bed. The northern half of the site to the north of Campbell Street is directly adjacent to the proposed rail line, and is shared with Site #6. The entire site is currently occupied by several businesses including a U-Haul dealer occupying a former A&P supermarket building. Most, if not all, of these buildings would need to be demolished in order to accommodate the Multi-modal Center. Since all of the properties fronting on Campbell Street would be removed as part of the proposed action, the section of Campbell Street between Third and Fourth Streets can be abandoned and/or incorporated into the site design since access does not need to be maintained depending on the site design. However, it is preferable to keep this cobblestone street open as a pedestrian feature that enhances the site. Another historic feature is the building located immediately adjacent to the railbed, which may be eligible for inclusion in the Wilmington downtown historic district. The southern portion of this block fronting Red Cross Street carries an historic property associated with an active furniture store and Shell gas station. Acquiring and preparing these properties for new construction may not be worth the expense or compatible with the WMMTC.</p>	<p>Current Tax Valuation: \$1,162,627</p> <p>Operations and Engineering Issues:</p> <ul style="list-style-type: none"> ■ Campbell and Fourth Street are not well-suited structurally to handle heavy vehicle traffic. ■ This site has the best opportunities for neighborhood-oriented retail joint development use if the composition included functions such as a grocery, dry cleaner/laundromat, pharmacy or eating establishments. <p>Advantages:</p> <ul style="list-style-type: none"> ■ Adequate right-of-way for all required features. ■ No at-grade rail crossings required. ■ This site has good opportunities for neighborhood-oriented retail joint development use if the composition included functions such as a grocery, dry cleaner/laundromat, pharmacy or eating establishments. Possible opportunities for public/private joint ventures. ■ Shortest construction of new RR track required west of 4th Street (400 feet). <p>Disadvantages:</p> <ul style="list-style-type: none"> ■ Routing pedestrians and bicyclists across Third Street would be both difficult and hazardous without encroaching into the existing rail right-of-way to go under Third Street. This passageway would also need some additional construction to repair the bridge deck – and more extensive reconstruction or replacement at a later date. ■ Longer walk times to major destinations. Will require schedule changes and re-routing of downtown trolley. A walkway from the WMMTC to the convention center is desirable, but would require utilizing the existing railbed through Site #2 that is controlled by CFCC. ■ Portion of either Site 4A or 3B may be lost due to RR extension. Crest vertical curve reduces sight distance on Third Street bridge, making egress out of the site at this location potentially hazardous and difficult to mitigate. May need to move access point or signalize intersection. ■ Numerous owners control this site.
<p>Site #5</p>	
 <p>U-Haul Rental</p>	 <p>Historic St. Andrews Church</p>
 <p>Historic Firehouse</p>	

Site #6: 3rd and 4th Street Site (North & South of Railbed)

Land Area: 1.6 acres

Walking Distance to Convention Center:

- 1,400 feet via RR Bed
- 1,800 feet via Hanover
- 2,200 feet via Red Cross

Description of Property and Ownership:

Site #6 is very similar to Site #5 except that it straddles the existing railroad bed and requires property north and south of the railroad bed. North of the RR bed, the site is split into two sections. The northern portion is at-grade along Hanover Street and is currently occupied by residential units, which although dilapidated, are reported to have historic significance. These units are adjacent to businesses fronting on Hanover Street. The below grade portion of the site north of the RR bed is occupied by a CFCC parking lot with approximately 90 spaces as well as the existing RR bed. The dilapidated residential units and the buildings with businesses would need to be demolished and the parking spaces would be removed in order to accommodate the Multi-Modal Center. The property north of the railroad tracks is insufficient in size by itself to accommodate all the functions of the WM/MC; hence this property was assumed to also extend south of the RR bed to Campbell Street onto Site #5. This portion is above the grade of the railbed and may carry at least one historic structure.



Site #6

Current Tax Valuation: \$885,176

Operations and Engineering Issues:

- Extension of RR track west of 4th Street required (400 feet).
- The northern and southern thirds of this site would probably have to accommodate some sort of bridging structure to accommodate parking or second-floor uses such as offices or joint development uses.

Advantages:

- No at-grade rail crossings required.
- This site has good opportunities for neighborhood-oriented retail joint development use if the composition included functions such as a grocery, dry cleaner/laundromat, pharmacy or eating establishments. Possible opportunities for public/private joint ventures.
- Shortest construction of new RR track required west of 4th Street (400 feet).

Disadvantages:

- Longer walk times to major destinations. Will require schedule changes and re-routing of downtown trolley. A walkway from the WM/MC to the convention center is desirable, but would require utilizing the existing railbed through Site #2 that is controlled by CFCC.
- Construction of new RR track required west of 4th Street (400 feet).
- CFCC parking lot north of the RR tracks and east of 4th Street will be lost requiring construction of replacement spaces.
- Crest vertical curve reduces sight distance on 3rd Street bridge making ingress/egress problematic from Hanover Street.



Mixed land use types along Hanover Street



Existing CFCA Parking on Railbed



Existing housing and historic structure

Appendix 5: Paratransit Alternatives Identified in the 2004 SRTP

The following text is an extract from the 2004 Short Range Transit Plan.

Complementary Paratransit Alternatives

Single rider, door-to-door service, where one paratransit rider is picked up at the door of an origin and dropped at the door of a destination is the least efficient form of paratransit. High costs per rider and per mile are generated in systems using this method of service, and the resulting operating cost burdens are much higher.

To better control costs for the provision of this service, the transit provider in the study area should consider implementing some level of alternative service delivery methods. In the case of Wave, any paratransit alternative is likely to utilize NHTS paratransit vehicles that are available as a result of the merger, as well as vehicles currently in use for DART services. The alternatives that follow have been used by large and small systems throughout the United States to achieve better quality service and increase transit options without placing an inordinate financial burden on the system.

Option 1—Transfer as many paratransit riders from paratransit vehicle-only trips to fixed-route transit as are able to use it to complete a part of their trip.

Under this system, paratransit vehicles would shuttle passengers to fixed route services. To operate this type of system, the transit system would need to adopt an operating policy that any passenger who is able to transfer to fixed route service from paratransit to complete any or all of a trip would be required to do so. The paratransit service would pick up passengers at a requested pick-up point only if they were not within a policy set distance of a fixed-route bus or if due to the nature of a disability or other limitation could not use fixed-route service. Those who were able to finish their trips on fixed-route services would request a transfer from the driver when paying their fare and would be dropped off at a transfer point to await a fixed-route vehicle to complete a trip.

In order to maximize productivity, the transit system could combine as many trips as possible using authority-wide policy limits of a set period of time (usually 2 hours or less). For example, if a passenger called for a 10:00 a.m. ride to travel to a doctor's appointment at 11:00 a.m., and a pickup was already scheduled in the area at 9:00 a.m., the passenger would be scheduled for a pickup close to the 9:00 a.m. time. If the passenger did not wish to go earlier or later than the requested time, the request could be denied for that day since the system—as set by policy—accommodated the request within the set period, but the passenger voluntarily refused the accommodation. Benefits of this operation include less demand on the paratransit system and an increased load factor for services provided. With a decreased demand and increased load, efficiency would be increased. Fixed-route operators would also experience an increase in efficiency due to slightly higher load factors due to added riders from paratransit services.

Although these benefits are likely, drawbacks for paratransit riders include the potential for dissatisfaction with paratransit and fixed-route services, which has the potential to lead to eventual decreases in ridership over time. Paratransit riders, like fixed-route riders, prefer a one-seat ride. Since this alternative is likely to result in an at least a two-seat ride for each trip, the ride quality may be perceived to be lower. In addition, the potential to miss an appointment and being asked to travel up to two hours beyond the preferred time can also cause rider dissatisfaction.

For fixed-route passengers, having to wait while a person with a disability takes additional time to board can be a source of dissatisfaction. Studies have shown that perceived waits are as much as double for those awaiting transit departures and even though it may take only one extra minute for a person with a disability to board, the other passengers perceive the wait as an inconvenience or a nuisance. Fixed-route ridership by non-disabled persons may not increase as desired or even drop off after initial ridership has increased. Customer complaints may increase after a while if a higher percentage of riders with disabilities begin using the buses and are taking longer periods of time to board.

Fare equity issues are also a source of dissatisfaction. If a passenger pays a higher rate to use the paratransit vehicle, but is at some point forced to transfer to a fixed-route vehicle, the passenger will perceive that situation

as unfair. If this alternative is chosen to provide service, the implementation of a reduced paratransit fare may be necessary.

Option 2: Combine paratransit rides

In this alternative, a policy much like the one described above is used to increase load factors on paratransit. The buses will have higher loads and serve more passengers; however, correspondingly more frequent pick-ups and drop-offs per “run” will result. This has the potential to increase the length of time each rider stays on the bus. Even those making reasonably short trips may experience increased time on board the bus, which may decrease customer satisfaction.

Another difficulty with this alternative is that the focus of the system may shift from the system as a whole to the individual rider, resulting in dissatisfaction from riders who feel as if their trip is inefficient. Any gain in productivity realized by this alternative would result in the need for users of the current paratransit system to make adjustments to work, medical, and family schedules to use a consolidated system.

Option 3—Some fixed-route paratransit service

Many paratransit operations have regular daily riders who travel to and from work, to and from school, and to and from other activities. To serve these regular paratransit trips, many systems dedicate vehicles to operate semi-fixed routes to serve these passengers. This option looks at instituting some or all of the regular fixed-route vehicles on a “flex-route” fixed-route, with either point-to-point deviations to accommodate service requests or deviations from a fixed “spine” of a route.

Route or point deviation (flex-routing) has the potential to meet the non-program transportation needs of the elderly, disabled, and low-income along specified corridors, providing people with access to transit services without the burden of operating an expensive low-productivity complementary paratransit service. Point-to-point service allows there to be regular “bus stops” in addition to extra time in between stops to accommodate ride requests. Provided a rider makes a request and there is time in the schedule to allow for a pick-up, the rider is picked up and dropped off as appropriate to accommodate the request.

Stops for this type of service can be non-traditional and might include a dialysis center, a hospital, an assisted living center, a sheltered workshop or day-care center, or in a commercial strip or office park—places where a traditional transit vehicle may not go. Establishing a regular schedule for travel between points where many requests are received each day rather than have everyone scheduling rides by calling in a request improves efficiency.

Requests for pick-up need to be made in advance, but drop-offs within the flex-route service area do not. Passengers board at established points and ask drivers to drop them off at or near their desired destination. This deviation pattern works well in low-density areas where there is little demand between individual trip generators.

Spine or route deviations use fixed routes and have established stops, but there is extra time built into the route to allow for deviations. Requests are handled by vehicles leaving the route at a specific points to make pick-ups or drop-offs as requested. Once a request is accommodated, the bus returns to the route at the same point it left so as not to miss individual stops. This type of service works well where there is higher density and more calls for stops along the spine of the route.

Either of the flex-route options has timed bus stops at places where it is safe for the bus to idle to ensure it stays on schedule when there are few deviation requests. There is no “flexibility” in times, so passengers expecting the services of a normal fixed-route-type bus will not have to guess when (or if) a bus will come. Time points are served exactly as in a fixed-route system.

Appendix 6: Southeast NC Passenger Rail Study

This appendix reproduces the recommendations and ‘next steps’ from the 2005 Southeast North Carolina Passenger Rail Study.

Recommendations

This study reinforced earlier findings indicating there is significant interest in and a basis for reinstating intercity passenger train service to and from southeastern North Carolina.

- First, there is considerable public support for expanding passenger rail service to the eastern and western areas of the state. Expansion of passenger rail service to Wilmington not only would serve the intrastate market, but also would serve the interstate market via connections with national system long distance passenger trains.
- Second, infrastructure investments made to support passenger rail service also benefit freight trains and shippers served by the same tracks. There also is a positive economic benefit to restoring the tracks between Wallace and Castle Hayne since the reintroduction of freight rail service would enhance the potential for economic development along that corridor.

Before passenger rail service could begin on any of the study routes, significant investments would be required to improve the rail infrastructure and acquire equipment to implement intercity service. Such capital investments require a partnership among the local, state and federal governments and private entities. Currently, state funds are not available to support the level of investment required to implement the new passenger service. However, the department should take measures to preserve the option to initiate the service when funds are available to develop the routes.

Based on the ridership and projected capital costs, the Raleigh to Wilmington routes via Goldsboro and Fayetteville should be included in the State Rail Plan and pursued in the future. The route to the Northeast from Wilmington to Rocky Mount should be eliminated from further consideration due to the low ridership projection. While both Raleigh to Wilmington routes that were analyzed held promise, the availability of public funding will determine when and what service is implemented.

During the course of study, additional issues were identified that address passenger and freight transportation needs and the economic impacts of improved rail service. Among those issues were freight rail service to shippers as well as our state ports and the Global Transpark, increasing highway congestion, and the need to develop transportation alternatives. In addition to intercity passenger rail service to Wilmington, commuter service from Raleigh to Selma, continuing to Goldsboro and/or Fayetteville is receiving increased interest and support. Service from Raleigh to Goldsboro was found to be feasible and recommended for further study in the Easttrans Commuter Corridor Feasibility Study completed by Wilbur Smith Associates in April 2004. The study evaluated the feasibility of instituting commuter rail service in corridors east and south of Raleigh with endpoints of Goldsboro and Zebulon.

Next Steps:

- Implement intercity passenger rail services from Wilmington to Raleigh via Goldsboro and Fayetteville in phases as funds become available.
- Work with local governments and the railroads to evaluate initiating commuter service between Selma and Raleigh as a first step. This service would be common to both the Goldsboro and Fayetteville routes and provide significant benefits due to the following:
 - Robust population growth in Johnston County is projected to continue;

- Commuter traffic is increasing and the US 70 Bypass is expected to be at capacity when completed;
 - There is increased interest in developing alternative modes of transportation;
 - Commuter rail service would provide an alternative to congested highways and the associated air pollution. Extensions of commuter service to Goldsboro and/or Fayetteville would be considered as money becomes available and as the market for such service warrants;
 - The commuter rail service would develop and demonstrate the state, regional and local government's ability to work together and with the railroads in implementing, operating, and planning alternative transportation.
- Work with state and local governments, host railroads and other business interests to help secure a federal funding partner to obtain the necessary money to develop passenger service. Freight partnerships can be identified for joint funding of track and crossing improvements where there are clear benefits to each party.
 - Work with the Department of Commerce, State Ports Authority and Global Transpark to further define benefits and investments needed to reestablish freight rail service between Goldsboro and Wilmington to provide more direct freight access to markets north and west.
 - Partner with the State Ports Authority and freight railroads to develop dual rail carrier access to both Wilmington and Morehead City. Multiple rail transportation options are critical to retaining current customers and attracting new ones to seaports and are vital to being competitive in the world market. Single rail carrier service to Wilmington and Morehead City limits the market for our state ports.
 - Conduct the necessary environmental and preliminary engineering analyses to clearly identify and preserve right-of-way needed along the Fayetteville and Goldsboro routes to implement future passenger rail service to Wilmington and acquire such property as it becomes available. This includes properties needed for connecting tracks in Goldsboro, Pembroke and Selma.
 - Recommend local governments, metropolitan planning organizations (MPOs) and rural planning organizations (RPOs) coordinate land use and transportation planning to enable transit friendly development, facilitate industrial growth and reduce/restrict the number of at-grade crossings along the routes.
 - Work with local governments along the routes to refurbish historic stations and partner with the city of Wilmington to acquire property and develop a multi-modal station.

Appendix 7: Transit Centers and Pulses in Comparable Cities

The following descriptions relate to service patterns at the time of writing (January 2009) and refer to local transit services (not Greyhound) in the weekday morning peak period.

Durham

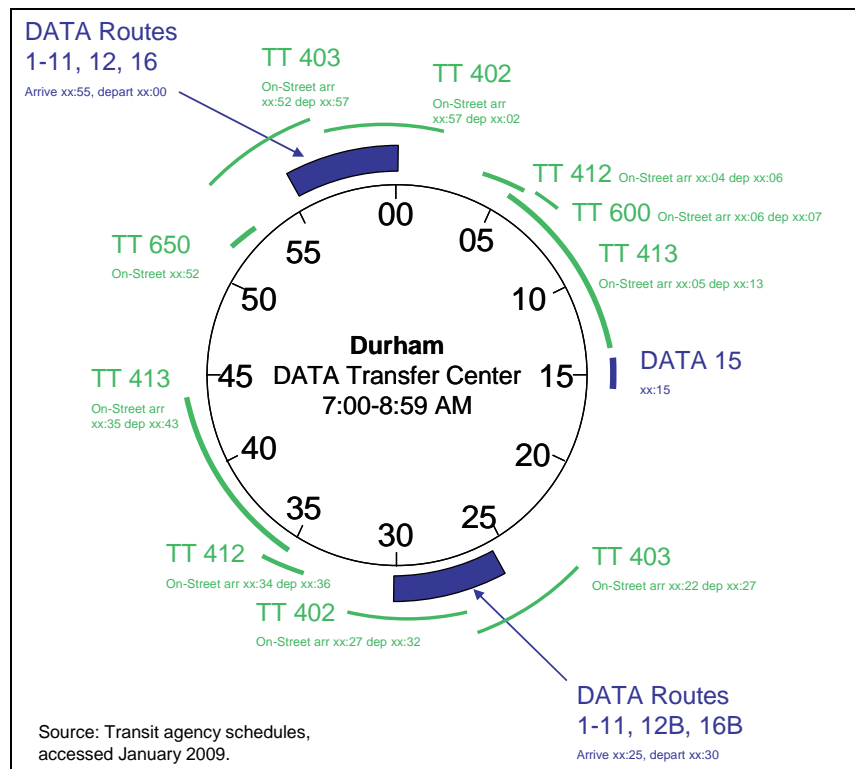
Services: The city transit agency (DATA) currently has 14 routes serving downtown and three routes that do not serve downtown. (This counts routes 12/12B and 16/16B as two rather than four routes). Some of the routes interline at downtown. One downtown route runs hourly off-pulse, and the other 13 run half-hourly, pulsing at xx:00 and xx:30. Several Triangle Transit routes also serve on-street stops alongside the center.

Transit Center: The current Transit Center can squeeze in 13 buses using in-line random locations. The boarding island itself only has room for about 9 buses to load, but an uncurbed layover area is also used for boarding. Triangle Transit buses stop on Morgan Street and Main Street, rather than entering the center itself.

Pulse: The current pulses are at xx:27 and xx:57, with 13 DATA buses in the center and two Triangle Transit buses on-street.

Future plans: DATA is due to move into a new transit center, 'Durham Station', in early 2009. This will have 16 bays for DATA and Triangle Transit together. DATA's Short Range Transit Plan includes improved headways on some existing routes, and several new radial and suburban routes. The additional bays are therefore likely to be filled within a few years (unless DATA splits its services between opposing pulses).

Summary of position: The existing center has clearly been outgrown. The new transit center's 16 bays will be able to accommodate today's needs and a little extra.



Raleigh

Services: The city transit agency (CAT) currently has:

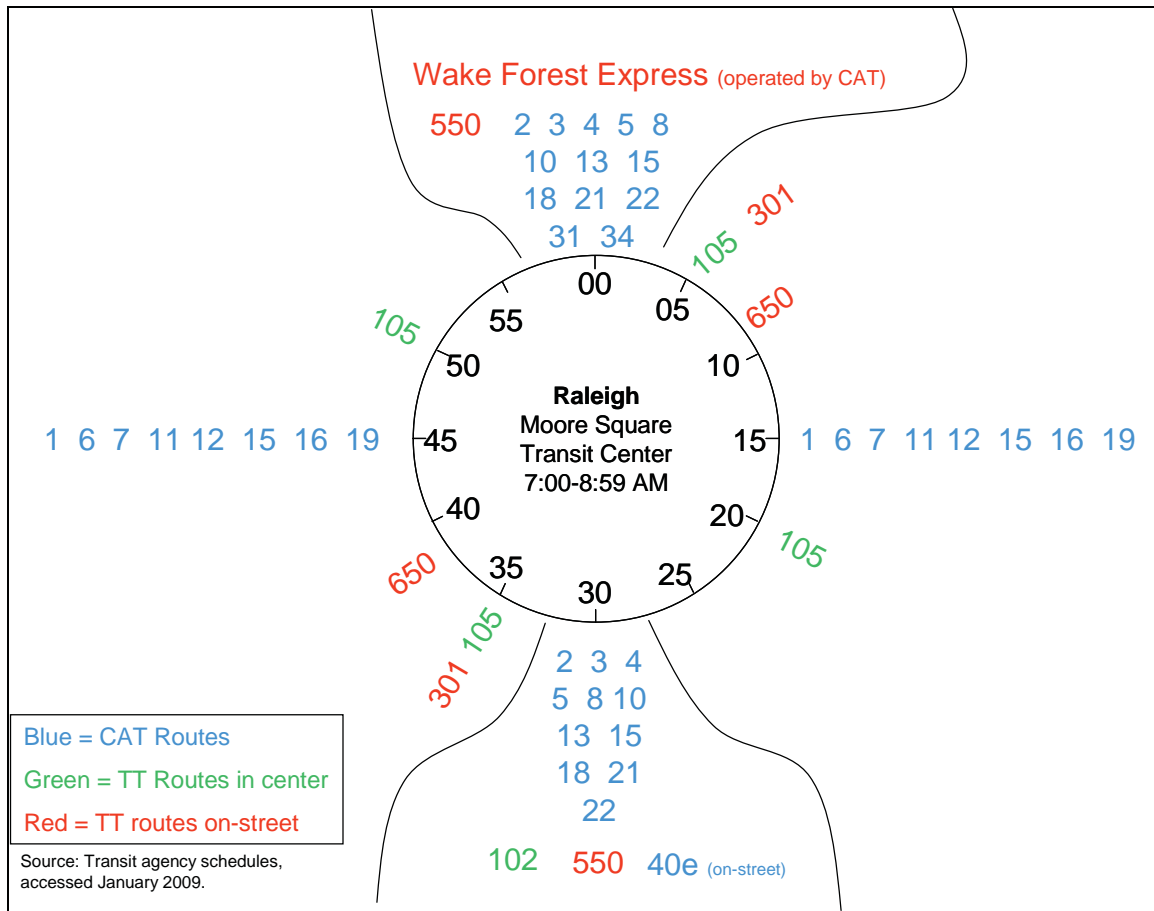
- 18 regular routes serving downtown, mostly operating half-hourly but split into opposing pulses.
- 1 express route into downtown (40e Wake Tech).
- 1 express route into downtown operated for Triangle Transit (Wake Forest Express).

CAT also operates seven suburban connector routes and one suburban express route. A downtown circulator is due to start early 2009, and will stop on Wilmington Street close to the center. Several Triangle Transit routes also serve downtown. Some use designated bays in the center, and others stop nearby on Wilmington Street.

Transit Center: Moore Square Transit Center has 16 bays plus additional stops on Wilmington Street and Blount Street. CAT services use the center, except for route 40e (Wake Tech express) which stops on Blount Street. Triangle Transit services 102 and 105 use bays in the center, but other Triangle Transit routes (including the Wake Forest Express operated by CAT on its behalf) stop on Wilmington Street.

Pulses: CAT services are currently split into opposing pulses – one set of routes at xx:00/XX:30, and another at xx:15 and xx:45. This allows all CAT services to use the center itself. Taking both CAT and Triangle Transit services into account, the busiest pulses are at xx:00 (13 in center + 1 on-street) and xx:30 (12 in center + 2 on-street).

Summary of position: The existing center could not accommodate today's service all at once. The split into opposing pulses gives the center enough capacity.



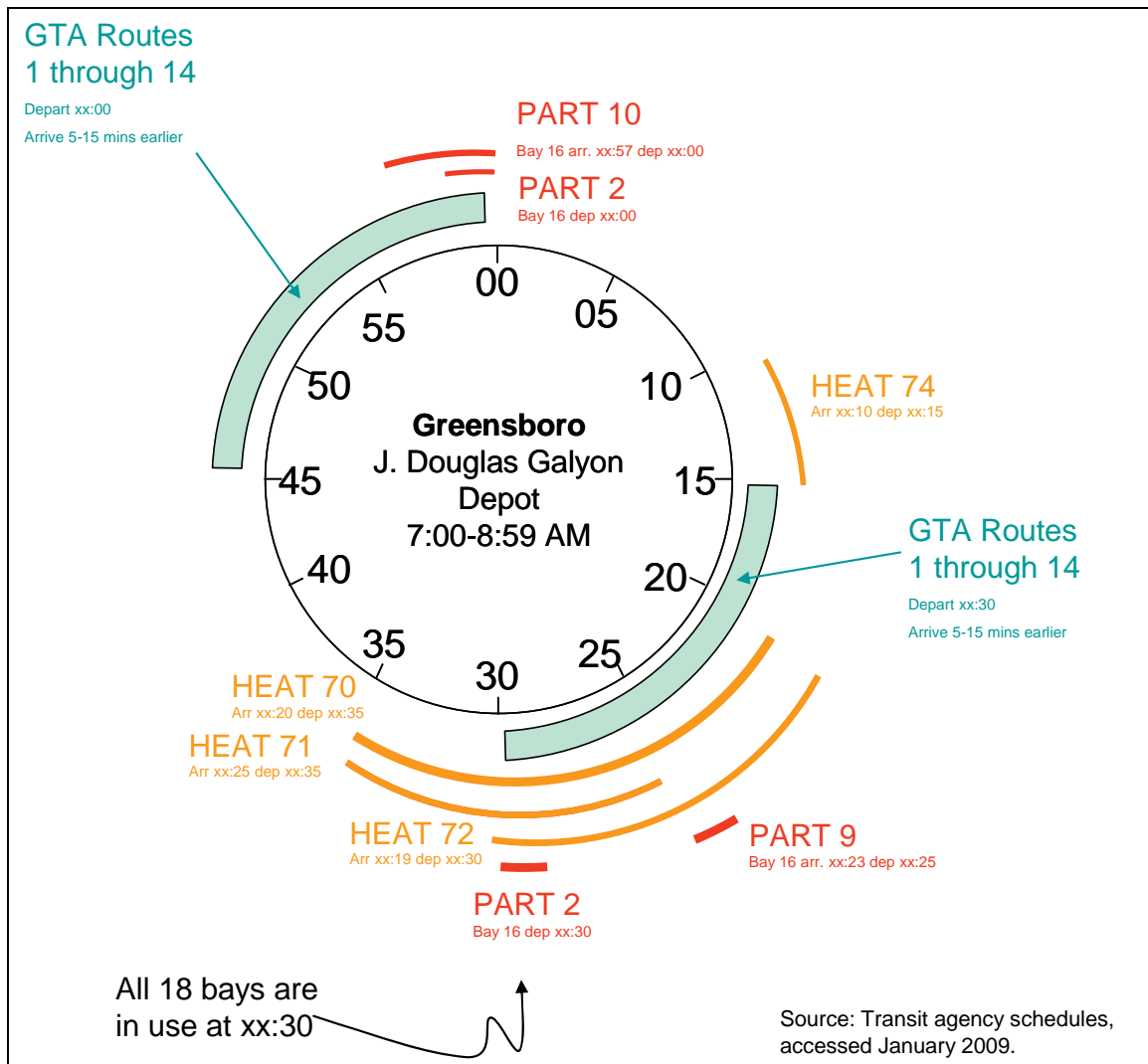
Greensboro

Services: The city transit agency (GTA) currently has 14 routes, all of which serve downtown, running half-hourly in a straightforward hub-and-spoke pattern and pulsing downtown at xx:00 and xx:30. GTA also operates the HEAT transit service which is focused on serving the city’s higher education institutions. Four of the HEAT routes serve the downtown transit center – three on-pulse at around xx:30 and a fourth off-pulse. PART regional transit services also run to the center, broadly on-pulse with one or two buses present at any time.

Transit Center: The J. Douglas Galyon Depot has 18 sawtooth bays for use by GTA and PART. The bays are some distance from a street frontage.

Pulses: The pulses are at xx:00 and xx:30. The strongest pulse is at x:30, when all the available bays are in use: 14 GTA routes, 3 HEAT routes and 1 PART route.

Summary of position: The existing center is full and can accommodate no additional services without introducing off-pulse services or opposing pulses.



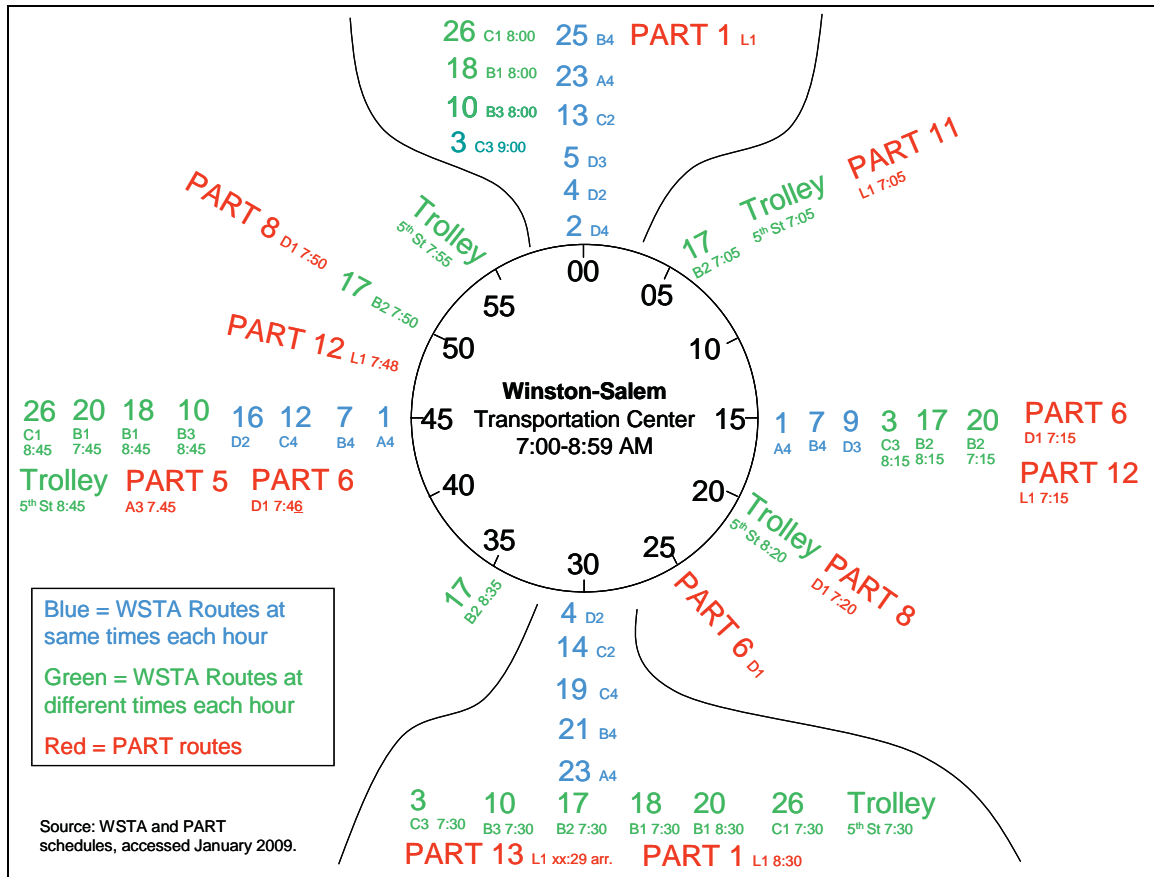
Winston-Salem

Services: The city transit agency (WSTA) currently has 19 routes serving downtown, plus a handful of suburban routes. The schedule is complex, with some routes hourly, some half-hourly and others on 45-minute or variable intervals. WSTA also operates a downtown ‘trolley’ bus service which stops on 5th Street opposite the transit center. PART regional transit services also run to the center, either using a bay or stopping on Liberty Street alongside the center.

Transit Center: The Winston-Salem Transportation Center has 16 sawtooth bays. A bus stop alongside the center on Liberty Street is treated as an additional bay. A service road behind the center has been used for the Amtrak connector service in the past.

Pulses: There are four main pulses, at xx:00/15/30/45, but with limited commonality from one to the next because of the complex schedules. From examining the schedules, the maximum occupancy in the morning peak is at 7:30 am, with 10 of the 16 bays occupied and the Liberty Street and 5th Street stops also occupied (a total of 12 buses present).

Summary of position: The existing 16-bay center could not accommodate the existing services on a single pulse, but with the current complex pulsing it has some room to space.



Appendix 8: Derivation of Long-Term Rail Ridership Forecast

This appendix describes how the ‘design rail ridership’ – that is, the ridership figure used for site planning purposes – was derived. It also includes the ridership estimates from the earlier WMTC studies, for ease of reference.

Earlier Studies

At the time of the 2000 WMTC study, there had been no estimate of potential ridership at Wilmington. The only available basis was the ridership forecasts for the South-East High Speed Rail project (which does not include service to Wilmington). The study concluded that annual ridership might range between 177,000 and 312,000. This led to a 3,000 sq ft waiting area being specified.

The 2004 WMTC study used the results of the 2001 *South-East North Carolina Passenger Rail Feasibility Study*, which had examined three corridors to/from Wilmington. The highest ridership of the three was to Raleigh, with a corridor ridership (all trips, not just Wilmington trips) of 43,700. Based on this, the waiting area was reduced to 1,500 sq ft.

Current Study – Inter-City Riders

Method 1: 2005 Ridership Forecasts: In 2005, revised ridership forecasts were issued in the *South-East North Carolina Passenger Rail Study* (a slightly different title from 2001). The corridor-level ridership in the maximum-investment scenario was forecast to be:

- Wilmington to Raleigh via Goldsboro: 74,100
- Wilmington to Raleigh via Fayetteville: 58,900
- Wilmington to Rocky Mount: 32,000

For this WMTC study, it is assumed that services operate to Raleigh via Goldsboro and to Rocky Mount. The sum of these two routes is 133,000 riders, but some riders are duplicated, so a combined total of 90,000 riders is assumed. It is then assumed that ridership to/from Wilmington is 70,000 out of the 90,000.

Method 2: Peer-Comparison: An alternative method is to assume that Wilmington will have ridership per capita in line with similar locations in North Carolina. Stations at Greensboro, Burlington and Raleigh currently have ridership of around 0.3 per head of city population; the statewide average for all stations is also close to 0.3. The table below shows the ridership which this rate would produce in Wilmington. Because the Wilmington urban area extends well beyond the city limits, calculations are shown for the MPO area as well as the city itself. Another way of interpreting the data is to use the Wilmington (city) population but assume a ‘railhead’ function, drawing riders from a wider area. Existing railhead stations include Rocky Mount (0.91 riders per capita), Wilson (0.56) and Selma (0.52). The table below therefore shows the result of having 0.5 riders per capita, using only the city population.

Conclusion: The two methods suggest a realistic potential range of 50,000 to 110,000 inter-city riders.

Year	Area	Population	Ridership @ 0.3 per capita	Similar to FY08 ridership in...	Ridership @ 0.5 per capita	Similar to FY08 ridership in...
2007	Wilmington (city)	101,000	30,000	Cary	50,000	Durham, Fayetteville, Rocky Mount
2015	Wilmington (city)	113,000	34,000	Cary	57,000	Fayetteville, Rocky Mount
2035	Wilmington (city)	137,000	41,000	Wilson	69,000	Fayetteville, Rocky Mount
2005	Wilmington MPO area	209,000	63,000	Fayetteville, Rocky Mount	n/a	n/a
2015	Wilmington MPO area	263,000	79,000	Greensboro	n/a	n/a
2035	Wilmington MPO area	366,000	110,000	Greensboro	n/a	n/a

Current Study – Commuters

Potential commuter service is conjectural at this stage and there are no ridership forecasts. For space planning purposes, it is assumed that a train load of riders might consist of three bi-level cars with all seats occupied but no standees. At approximately 120 seats per car, this represents 360 riders. It is important to emphasize that this figure is for space-planning purposes, and does not represent a specific ridership forecast.

Appendix 9: Derivation of Rail Parking Space Requirement

All calculations assume that parking demand at Wilmington is generated by inter-city service, not commuter service.

Method 1: Requirement over Thanksgiving

This method represents the day before Thanksgiving, with negligible business travel but heavy leisure travel. It is based on service capacity, and assumes that the anticipated two daily departures are filled with riders from Wilmington.

Wednesday departure to north-east	3 coach cars 70 seats per car 210 riders
Wednesday departure to Raleigh	3 coach cars 70 seats per car 210 riders
Total people leaving Wilmington	420
Proportion who arrive by car (see note below)	80%
Riders per car	1.2 Usual NCDOT Rail Division figure
Cars parked	280
Desired occupancy of spaces	95% would normally use 90% but can run to 95% for Thanksgiving
<u>Spaces needed</u>	<u>295</u>

of which, 7/8 are long-stay and 1/8 are short-stay

Method 2: Typical Day

This method represents a typical day, and is based on the assumed annual ridership.

Annual ridership	110,000
Design daily ridership	407 = annual / 270. Does not represent Thanksgiving.
Proportion leaving Wilmington	50%
Total people leaving Wilmington	204
Proportion who arrive by car (see note below)	80%
Riders per car	1.2 Usual NCDOT Rail Division figure
Cars being parked that day	136
Average length of stay	2 days. Business trips mostly 1 day, leisure trips may be longer.
Total cars parked at any time	272
Desired occupancy of spaces	90%
<u>Spaces needed</u>	<u>302</u>

of which, 7/8 are long-stay and 1/8 are short-stay

Assumed mode split of arriving passengers:

Based on experience at existing stations in North Carolina, it is assumed that:

- 70% drive and park
- 10% are dropped-off but driver parks
= total 80% parking
- 10% are dropped-off and driver does not park
- 10% arrive by other modes (taxi, bus, walk)

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Appendix 10: Site Layout Sketches

This Appendix reproduces the 28 site layout sketches (or ‘options’) that were produced during the study process. They are included in order to document the range of options that were considered and, in most cases, rejected. Some of the sketches showed that particular layouts were simply not feasible. Others showed that particular layouts might have been feasible, and illustrated the trade-offs that would be required between potentially conflicting goals. All of the sketches have been included for the record.

The table below summarizes the options and their impacts.

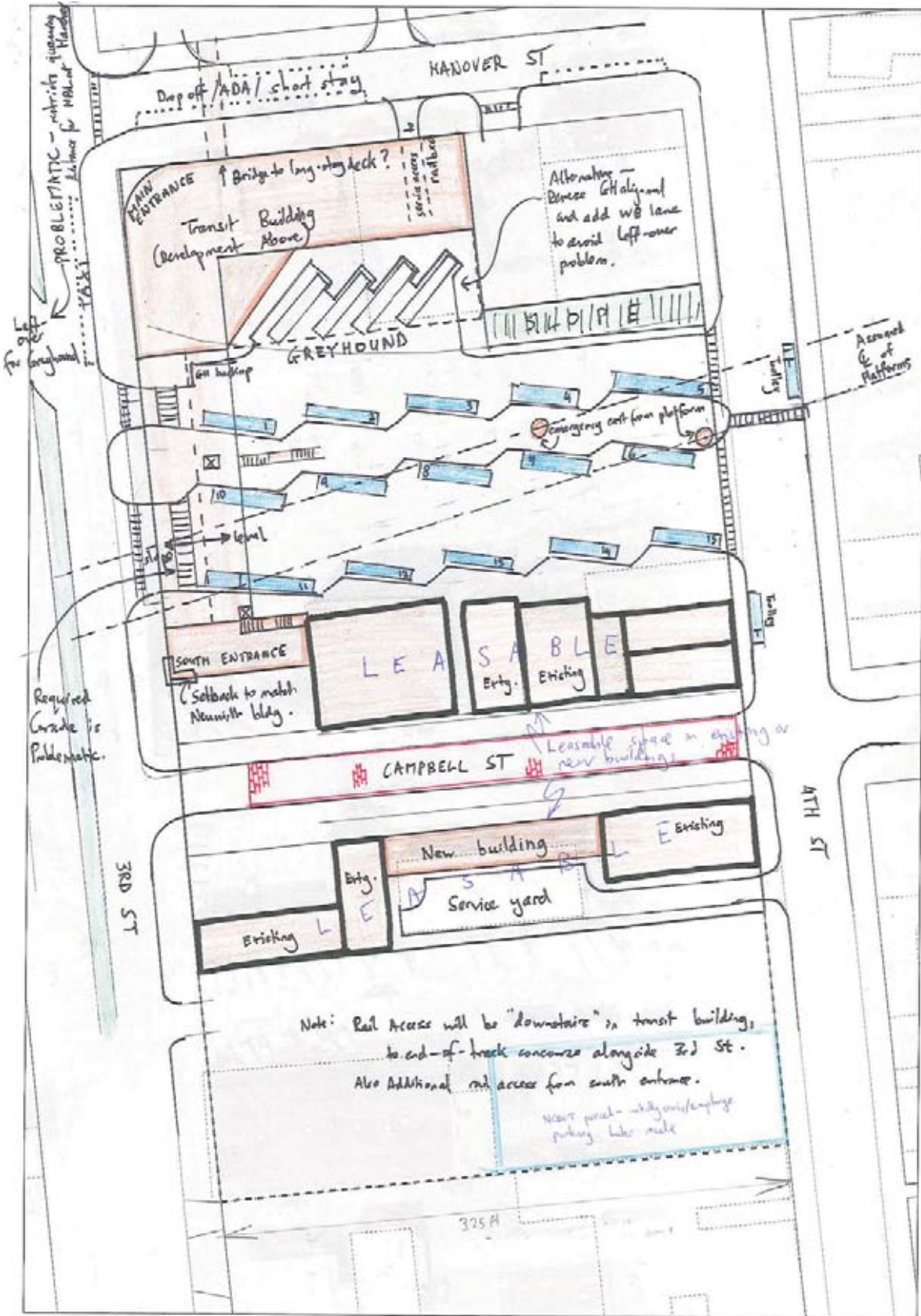
Option	Land/construction issues				Saves contributing structures?				Other historic/amenity issues					Transit Issues				Easy to fund / implement bus element?	
	U-Haul Site saved?	Slab needed?	Construction cost	Requires bridge elimination?	Neuwirth Bros	Neuwirth Bros extn.	G Stein (north side of Campbell St	Thomas Grocery	Campbell Street brick surface saved?	Overall impact on Campbell Street quality/character?	Buses use Campbell St?	Buses use Hanover St?	Overall impact on Hanover Street	3rd/4th St building frontages	Number of off-street Wave bus bays *	Buses / cars / peds separate?	Good drop-off etc. space?		Transit operations †
1	Saved	Yes	High	Yes	Saved	Saved	Saved	Saved	Saved	Good	No	No	Fair	Fair	15	Good	Good	Good	No
2	Saved	Yes	High	No	Saved	Saved	Gone	Saved	Gone	Fair	Yes	Yes	Poor	Good	12	Poor	Fair	Good	No
3	Saved	Yes	High	No	Saved	Saved	Gone	Saved	Gone	Fair	Yes	Yes	Poor	Good	13	Poor	Fair	Good	No
4	Saved	Yes	High	No	Saved	Saved	Gone	Saved	Saved	Good	No	Yes	Poor	Good	15	Good	Good	Good	No
5	Saved	Yes	High	No	Gone	Gone	Gone	Saved	Mostly saved	Fair	Part	Yes	Poor	Good	13	Good	Good	Good	No
6	Saved	Yes	High	No	Saved	Saved	Gone	Saved	Gone	Poor	Yes	Yes	Poor	Fair	12	Fair	Fair	Good	No
7	Saved	Yes	High	No	Gone	Gone	Gone	Saved	Gone	Poor	Yes	Yes	Poor	Good	16	Fair	Poor	Good	No
8A	Saved	No	Medium	No	Gone	Gone	Gone	Gone	Gone	Very poor	Yes	No	Good	Fair	15	Good	Fair	Good	Hist. pres. issues
8B	Saved	No	Medium	No	Saved	Gone	Gone	Saved	Gone	Very poor	Yes	No	Good	Fair	10-11	Good	Fair	Good	Hist. pres. issues
8C	Saved	No	Medium	No	Saved	Gone	Gone	Saved	Gone	Very poor	Yes	No	Good	Fair	11	Good	Fair	Good	Hist. pres. issues
8D	Saved	No	Medium	No	Gone	Gone	Gone	Gone	Gone	Poor	Yes	No	Good	Fair	12	Good	Fair	Good	Hist. pres. issues
8E	Part-taken	No	Medium	No	Gone	Gone	Gone	Saved	Gone	Poor	Yes	No	Good	Fair	13	Good	Fair	Fair	Hist. pres. issues
8F	Saved	No	Low	No	Saved	Saved	Saved	Saved	Gone	Fair	Yes	No	Good	Fair	10	Poor	Poor	Fair	Hist. pres. issues
8FF	Saved	No	Low	No	Saved	Saved	Saved	Saved	Gone	Fair	Yes	No	Good	Fair	8	Fair	Poor	Fair	Hist. pres. issues
8G	Saved	No	Medium	No	Saved	Gone	Saved	Saved	Gone	Fair	Yes	No	Good	Fair	11	Poor	Poor	Fair	Hist. pres. issues
8H	Saved	No	Medium	No	Saved	Gone	Gone	Saved	Gone	Poor	Yes	No	Good	Fair	14	Poor	Poor	Fair	Hist. pres. issues
8J	Saved	No	Medium	No	Saved	Gone	Gone	Saved	Gone	Poor	Yes	No	Good	Fair	12	Fair	Poor	Fair	Hist. pres. issues
9A	Taken	No	Low	No	Saved	Saved	Saved	Saved	Saved	Good	No	No	Good	Fair	15	Good	Good	Good	Yes
9B	Taken	No	Low	No	Saved	Saved	Saved	Saved	Saved	Good	No	No	Good	Fair	12	Good	Good	Good	Yes
9C	Taken	No	Low	No	Saved	Saved	Saved	Saved	Saved	Good	No	No	Good	Fair	15	Good	Good	Good	Yes
10	Taken	No	Medium	No	Gone	Gone	Gone	Gone	Gone	Very poor	No street	No	Good	Poor	14	Good	Good	Good	Hist. pres. issues
11A	Taken	No	Medium	No	Gone	Gone	Gone	Saved	Partly saved	Fair-to-poor	Part	No	Good	Good	16	Good	Good	Good	Hist. pres. issues
11B	Taken	No	Medium	No	Gone	Gone	Gone	Saved	Mostly saved	Fair	Part	No	Good	Good	15	Good	Good	Good	Hist. pres. issues
11C	Taken	No	Medium	No	Gone	Gone	Gone	Saved	Mostly saved	Fair	Part	No	Good	Good	14	Good	Good	Good	Hist. pres. issues
12A	Saved	No	Medium	No	Gone	Gone	Gone	Gone	Saved	Poor	Yes	No	Good	Fair	14	Fair	Fair	Good	Hist. pres. issues
12B	Saved	No	Medium	No	Gone	Gone	Gone	Gone	Saved	Poor	Yes	No	Good	Fair	11	Good	Poor	Fair	Hist. pres. issues
13	Saved	No	Medium	No	Saved	Gone	Gone	Saved	Saved	Poor	Yes	No	Good	Fair	9	Fair	Poor	Poor	Hist. pres. issues
14	Saved	Yes	High	No	Saved	Saved	Saved	Saved	Saved	Good	No	Yes	Poor	Good	12	Good	Good	Good	No

* If Campbell Street is being used as buses-only for bus bays, it counts as off-street.

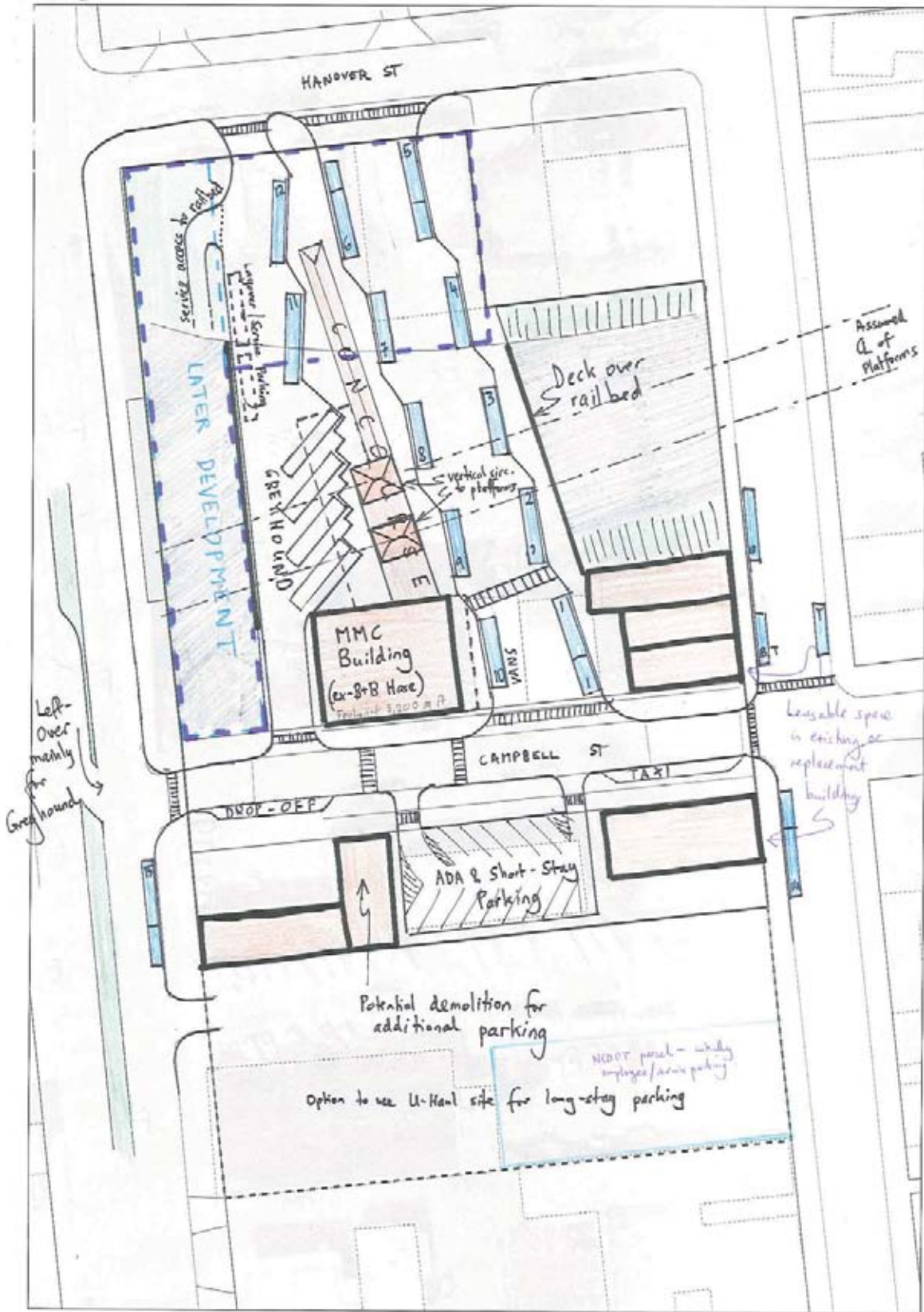
Figure shows bays for 40-foot or 60-foot buses. Some schemes have additional bays for smaller vehicles such as 22-foot cutaway buses.

† Includes issues such as ease of transfers, flexibility/ease of vehicle movements, etc.

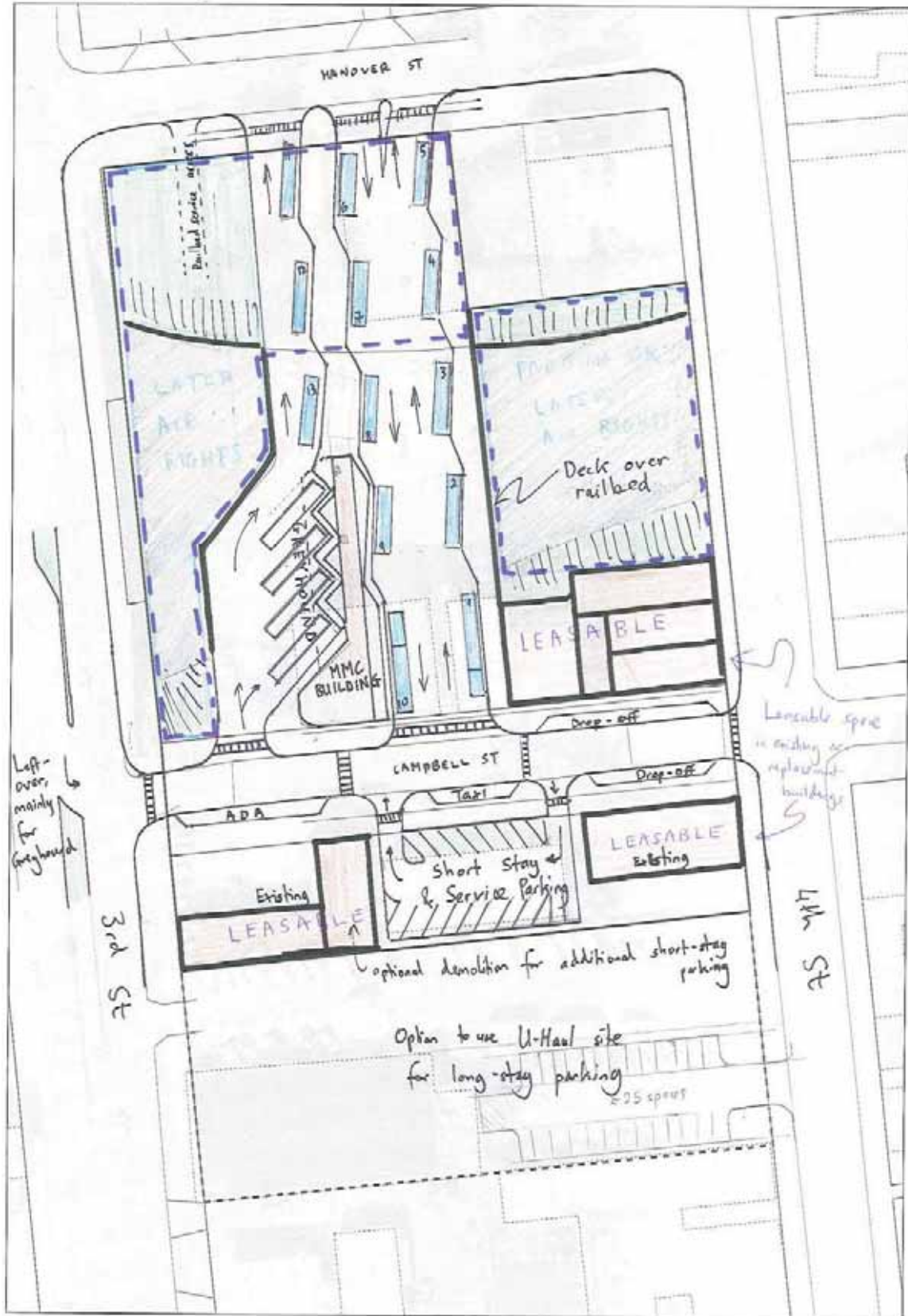
Green = good result Orange = fair result Red = poor result



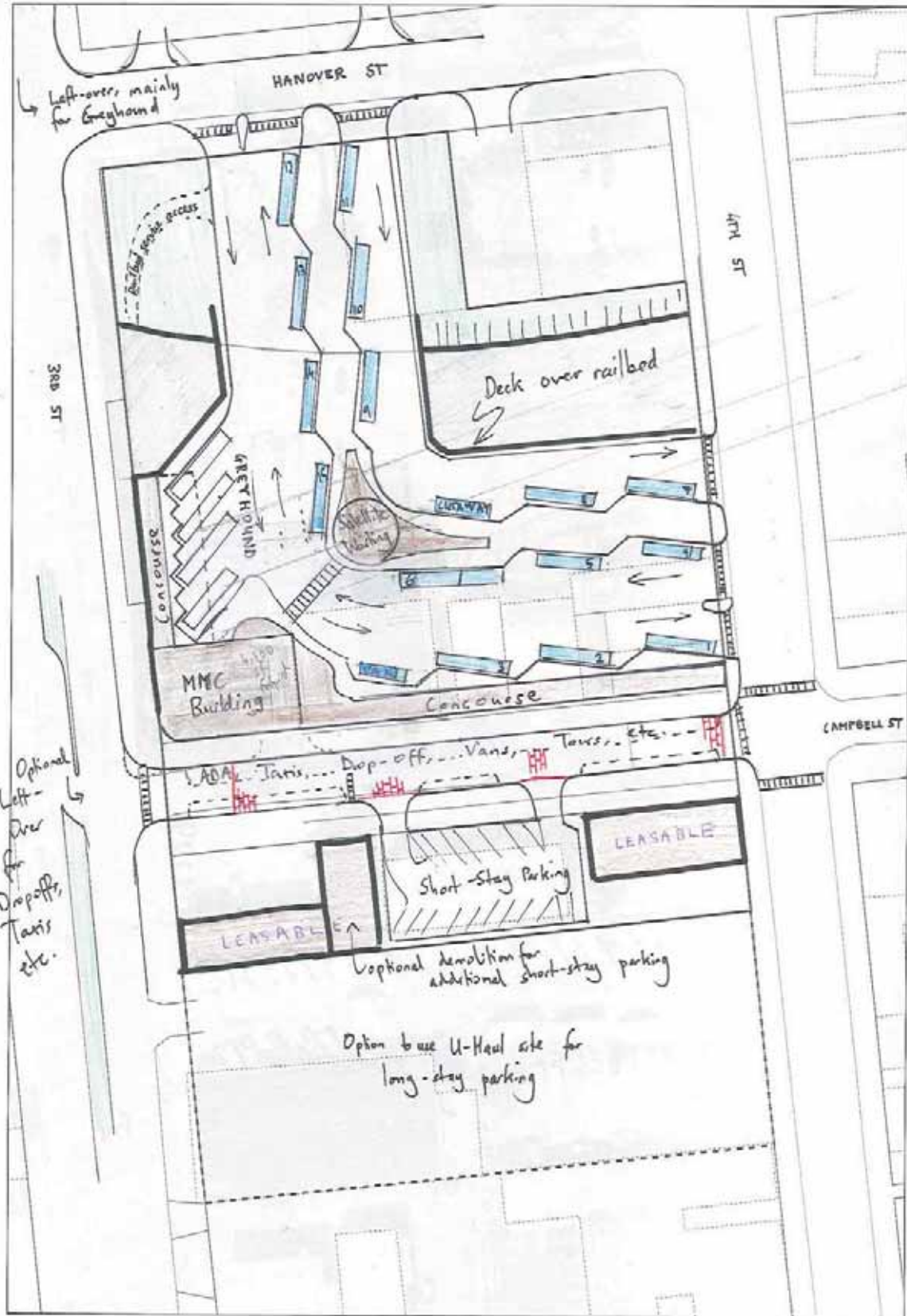
Sketch 1



Sketch 2



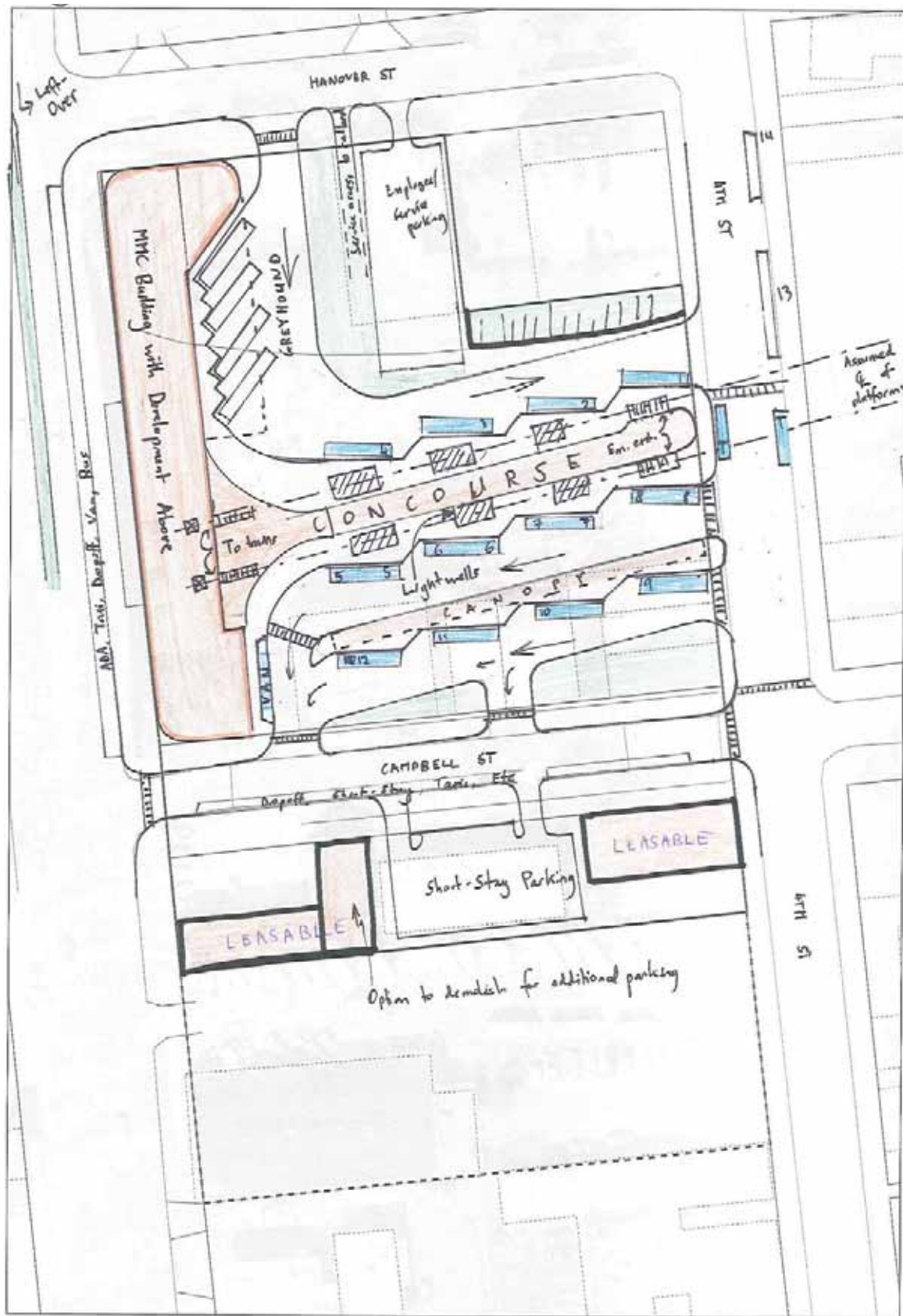
Sketch 3



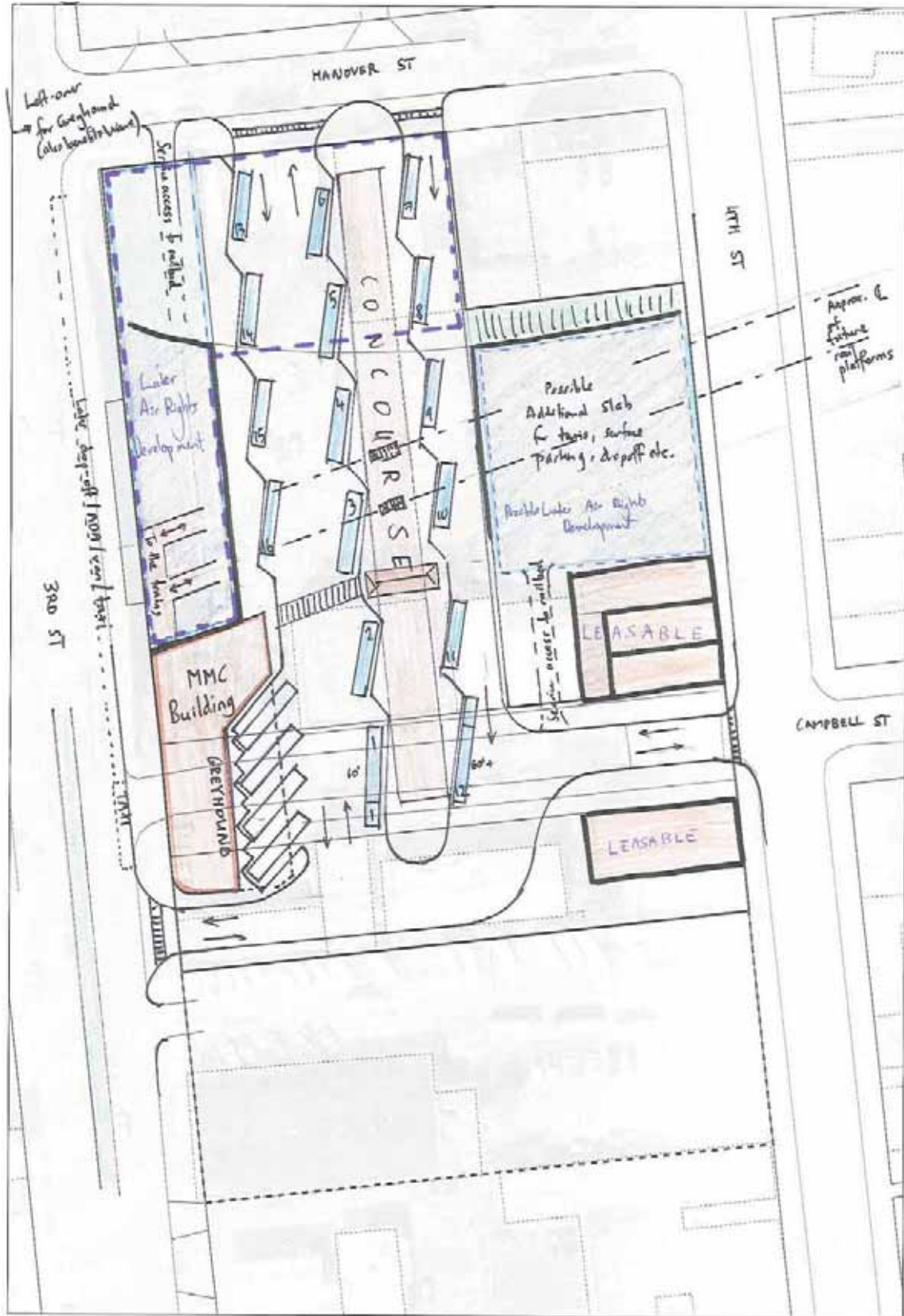
Sketch 4



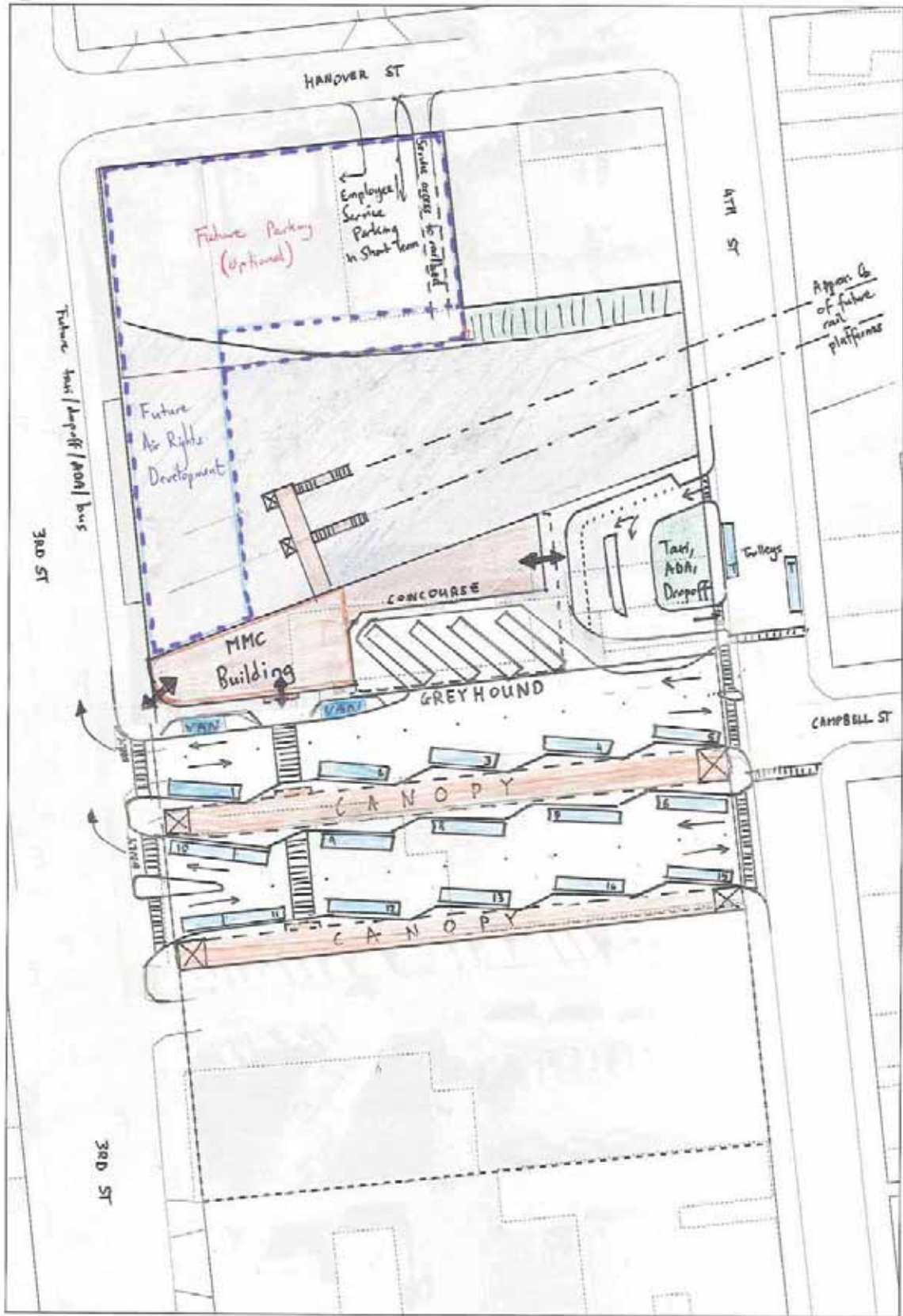
Sketch 5



Sketch 6



Sketch 7



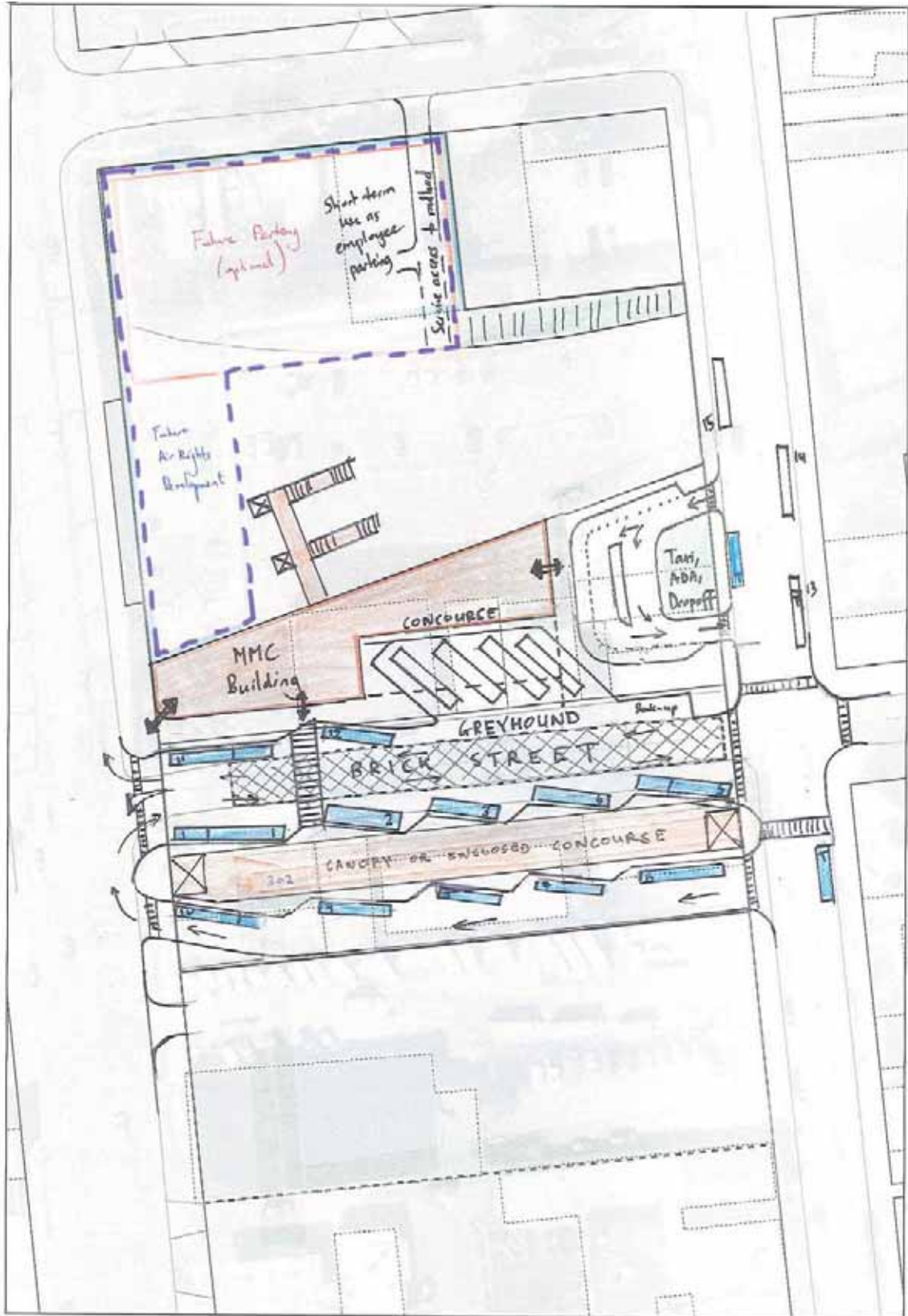
Sketch 8A



Sketch 8B



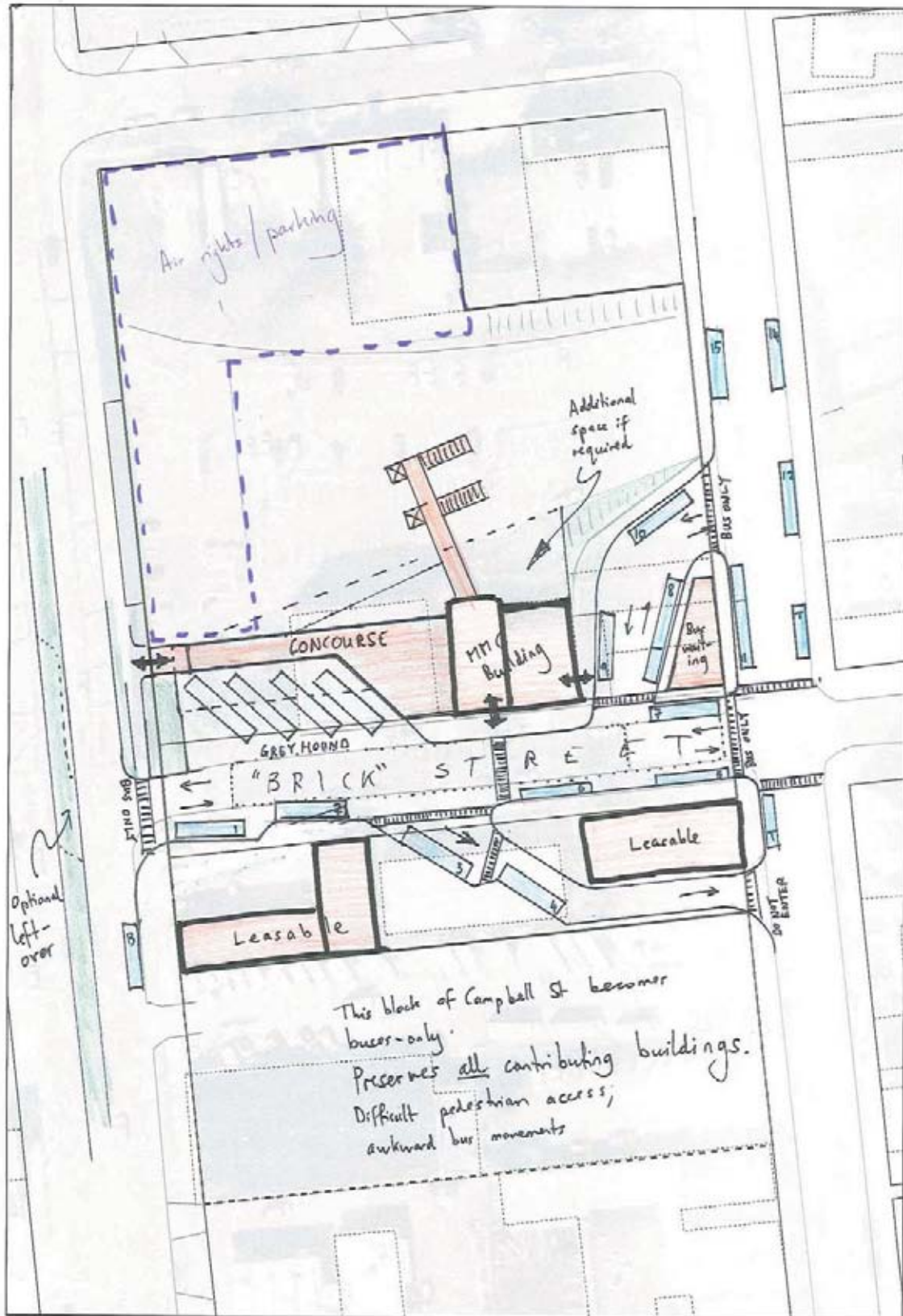
Sketch 8C



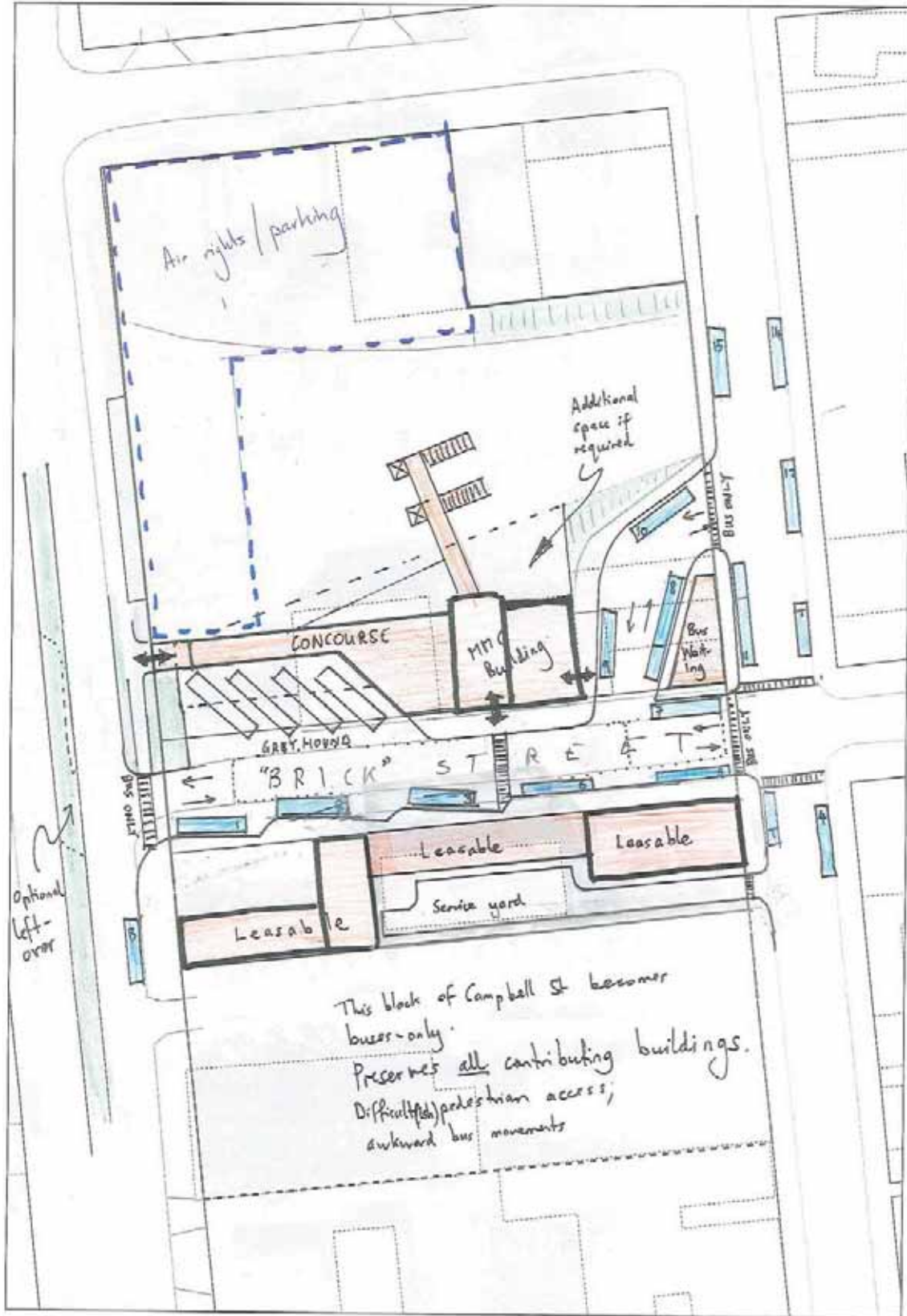
Sketch 8D



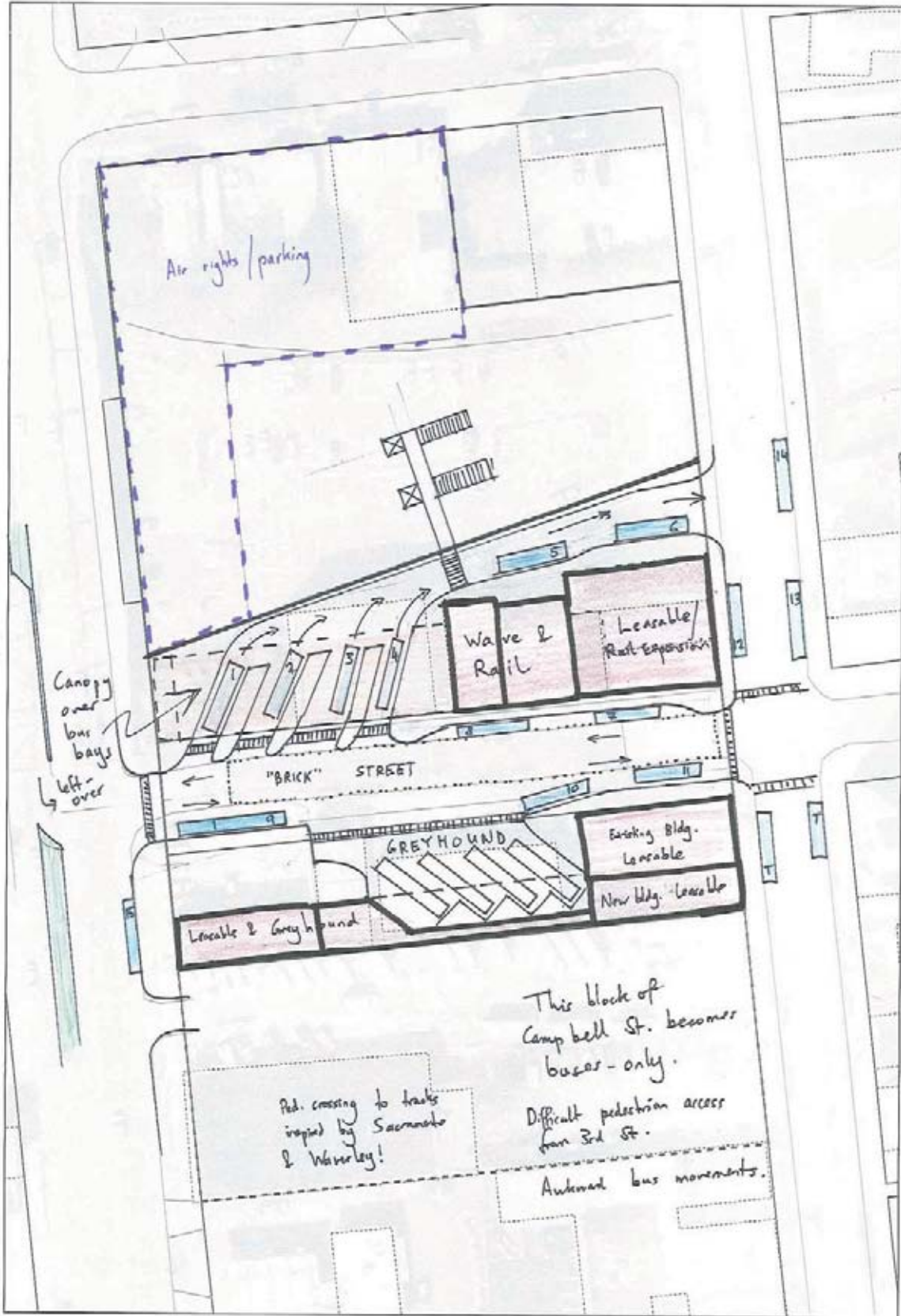
Sketch 8E



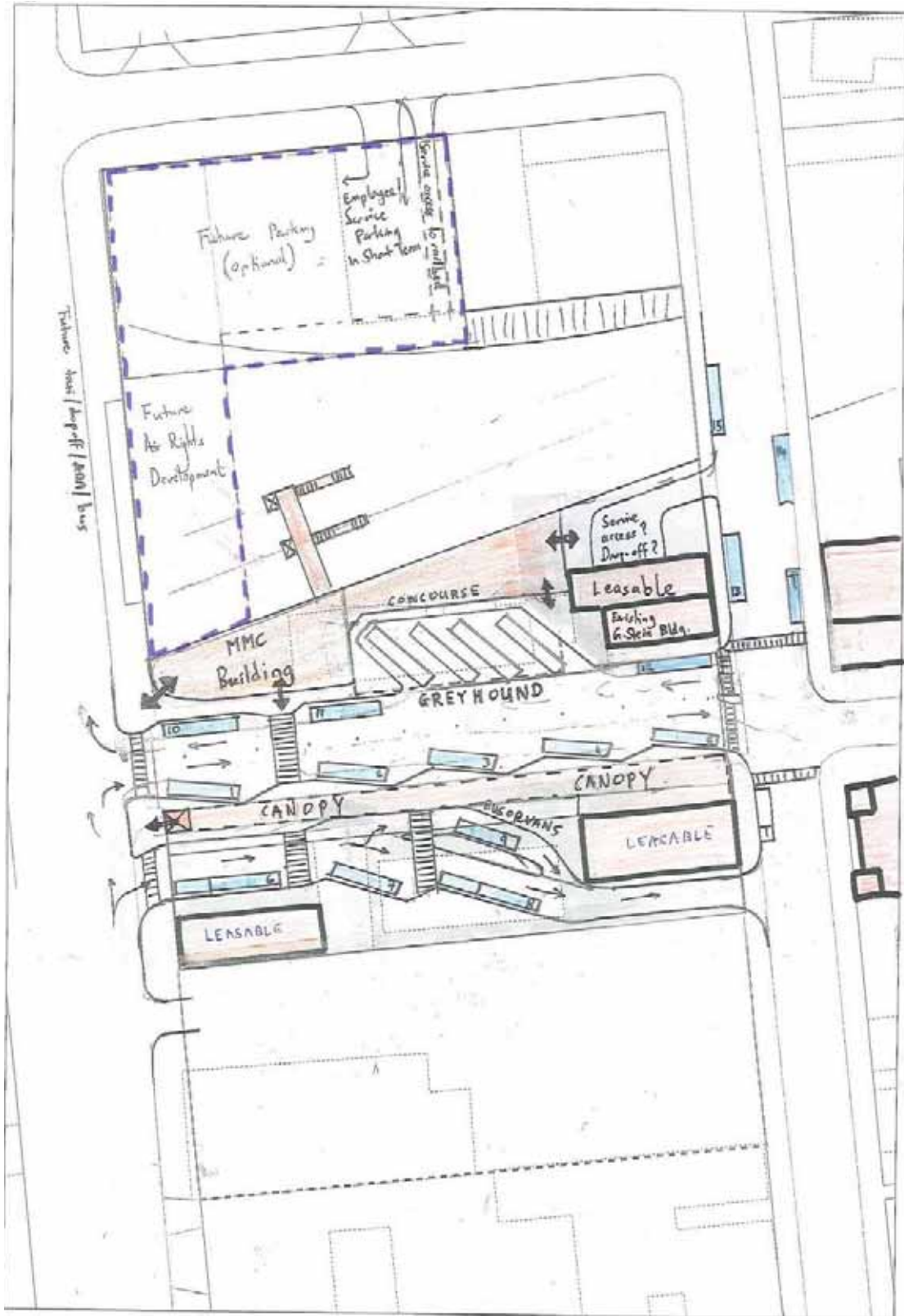
Sketch 8F



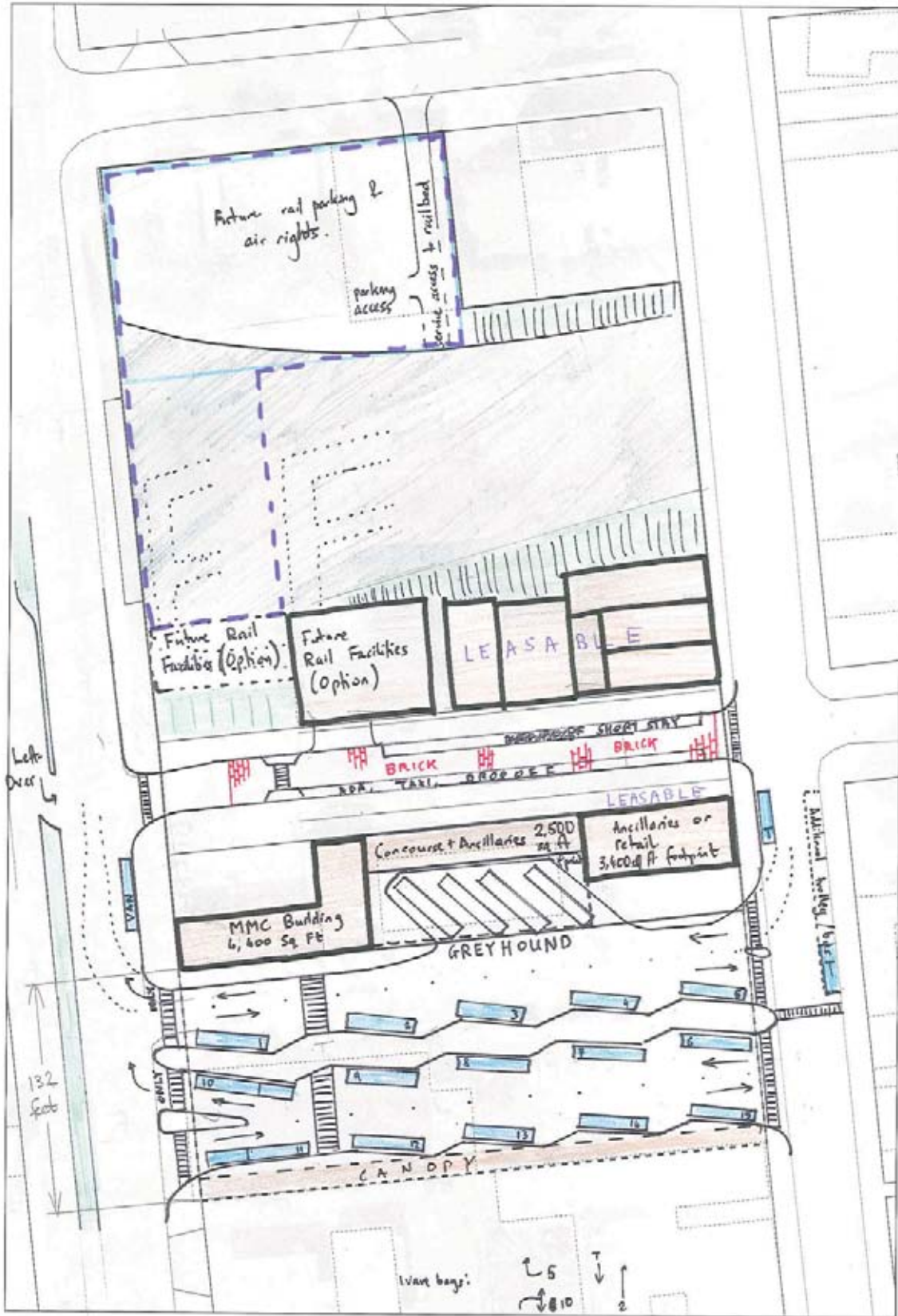
Sketch 8FF



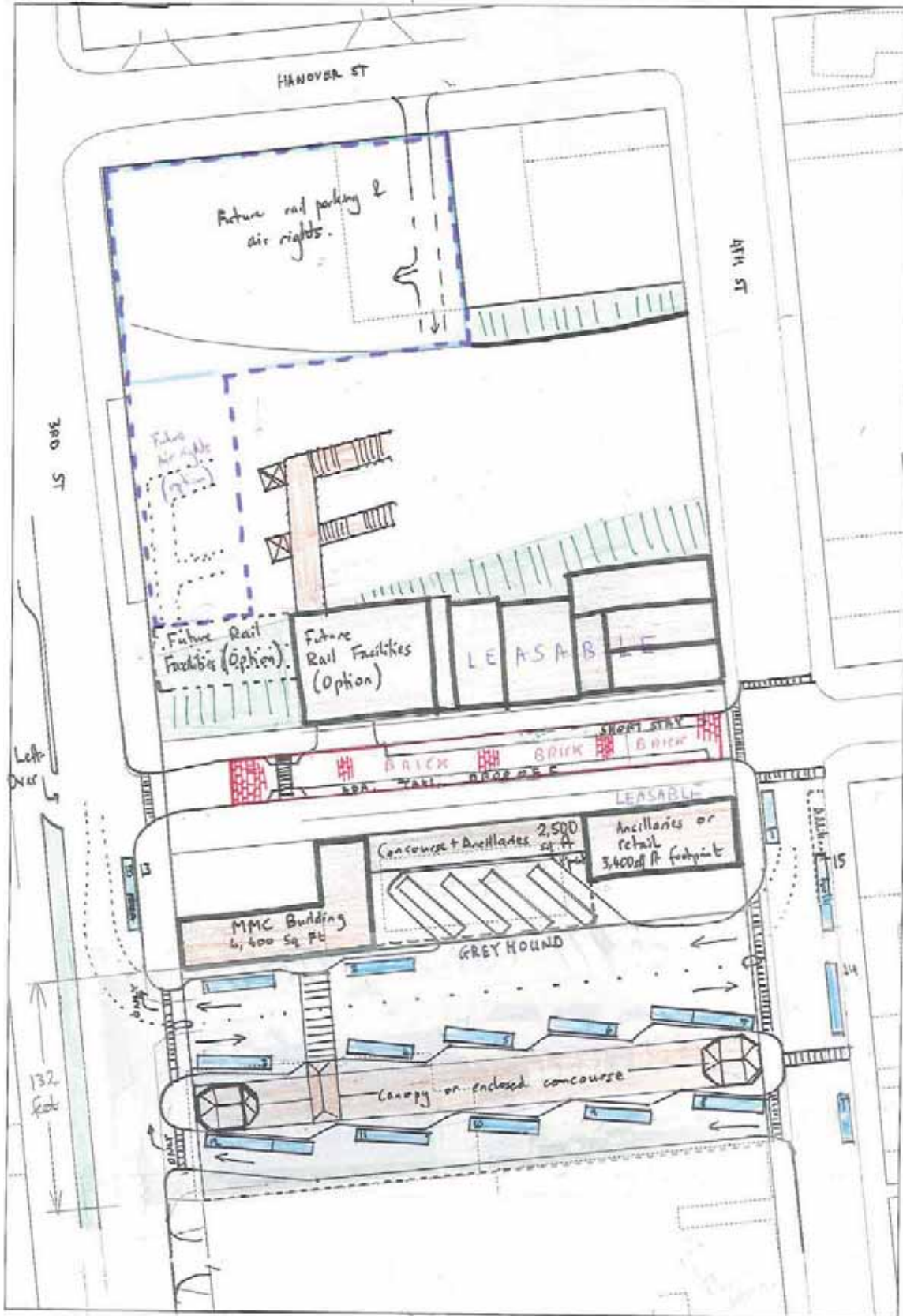
Sketch 8G



Sketch 8J



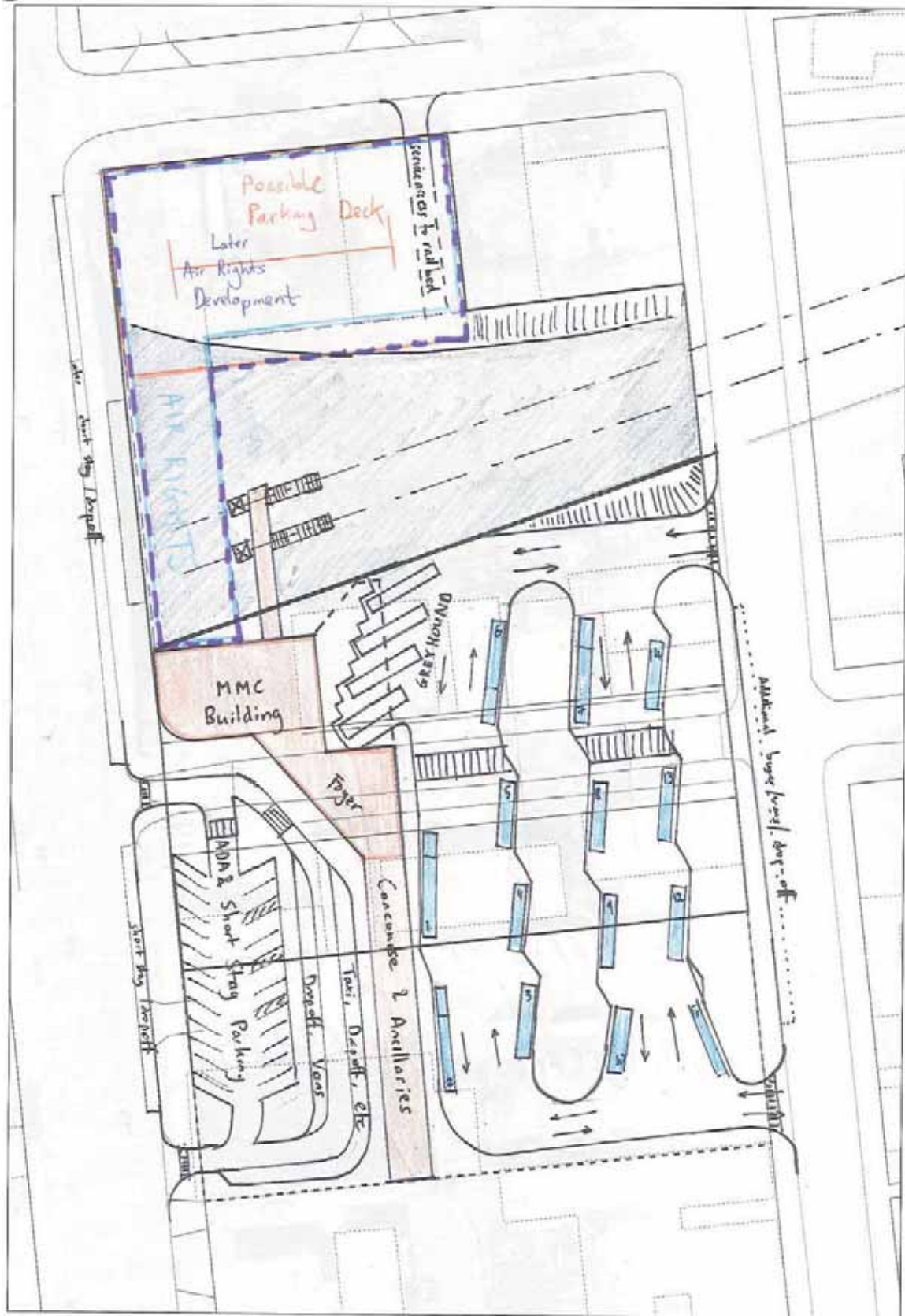
Sketch 9A



Sketch 9B



Sketch 9C



Sketch 10



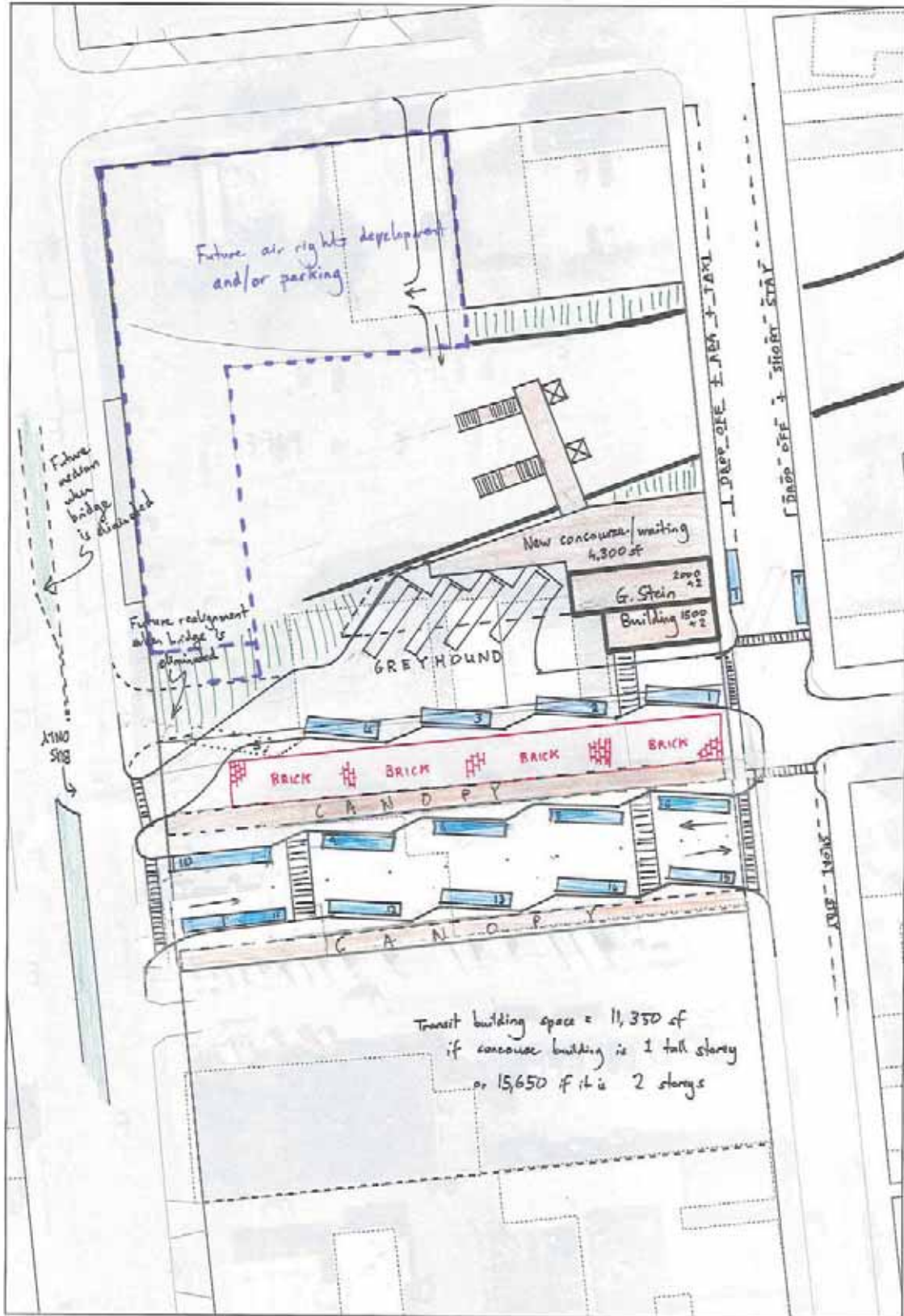
Sketch 11A



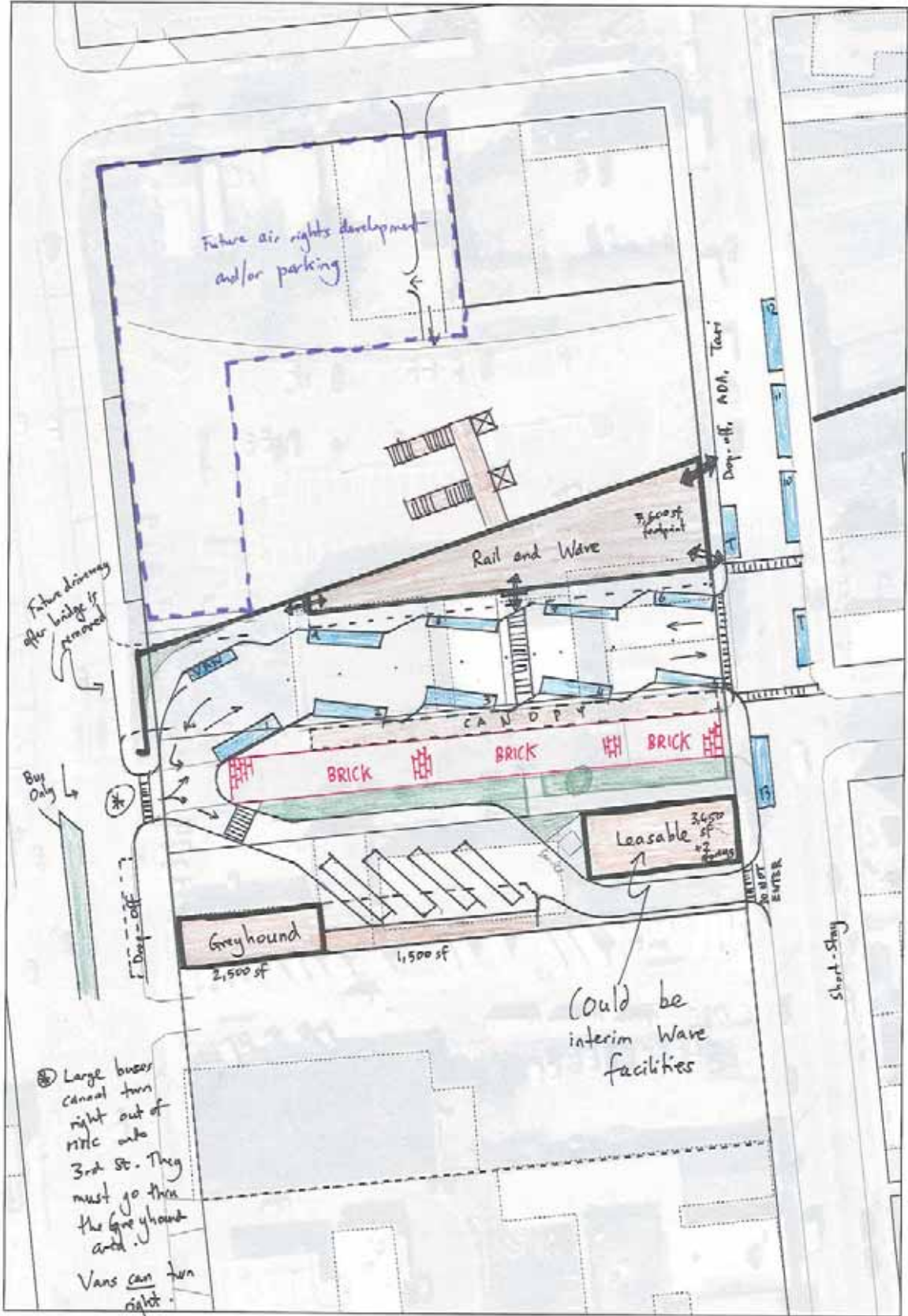
Sketch 11B



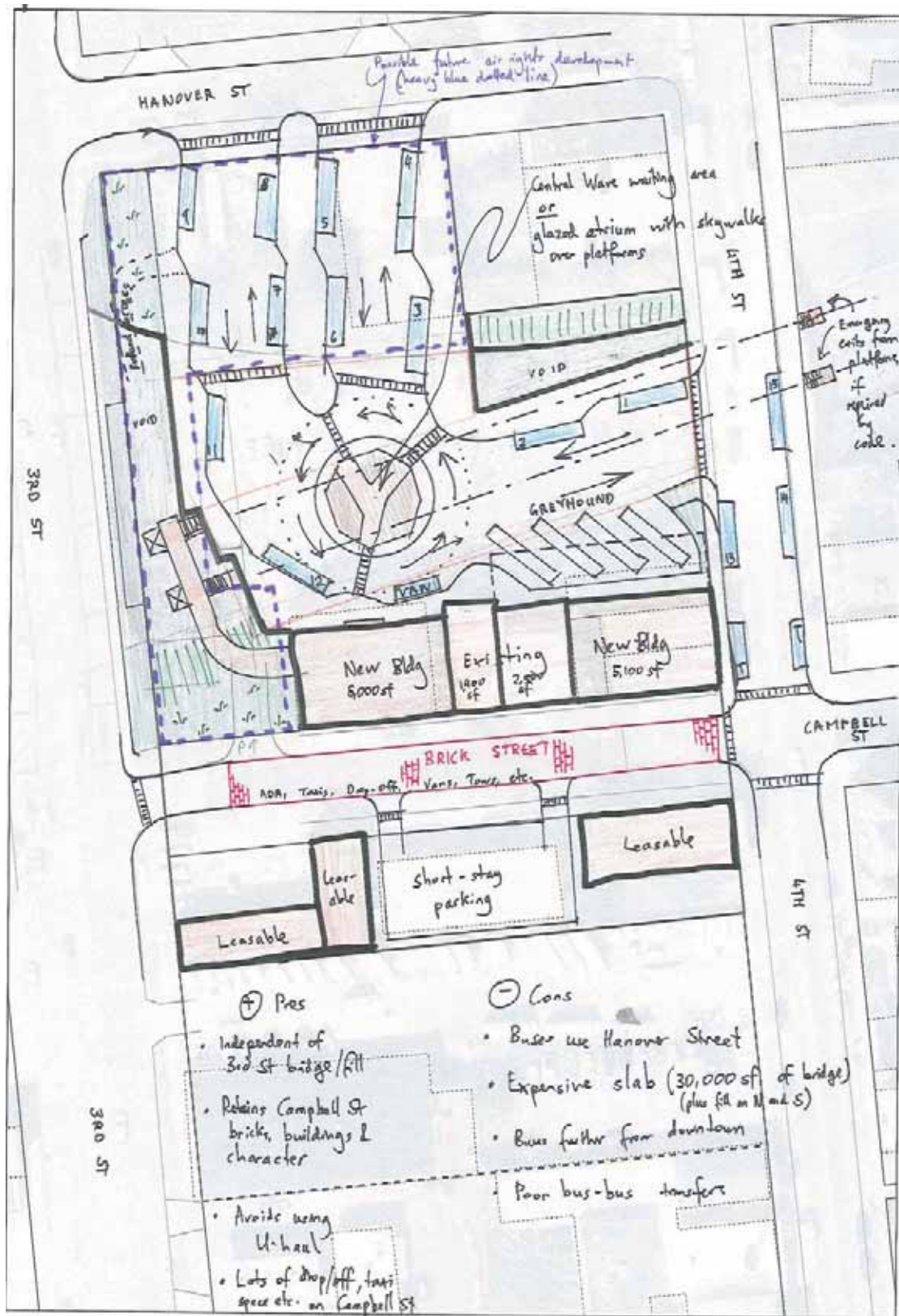
Sketch 11C



Sketch 12A



Sketch 13



⊕ Pros

- Independent of 3rd St bridge/fill
- Retains Campbell St bricks, buildings & character
- Avoids using U-haul
- Lots of drop/off, taxi space etc. on Campbell St

⊖ Cons

- Buses use Hanover Street
- Expensive slab (30,000 sf of bridge) (plus fill on N and S)
- Buses further from downtown
- Poor bus-bus transfers

Sketch 14