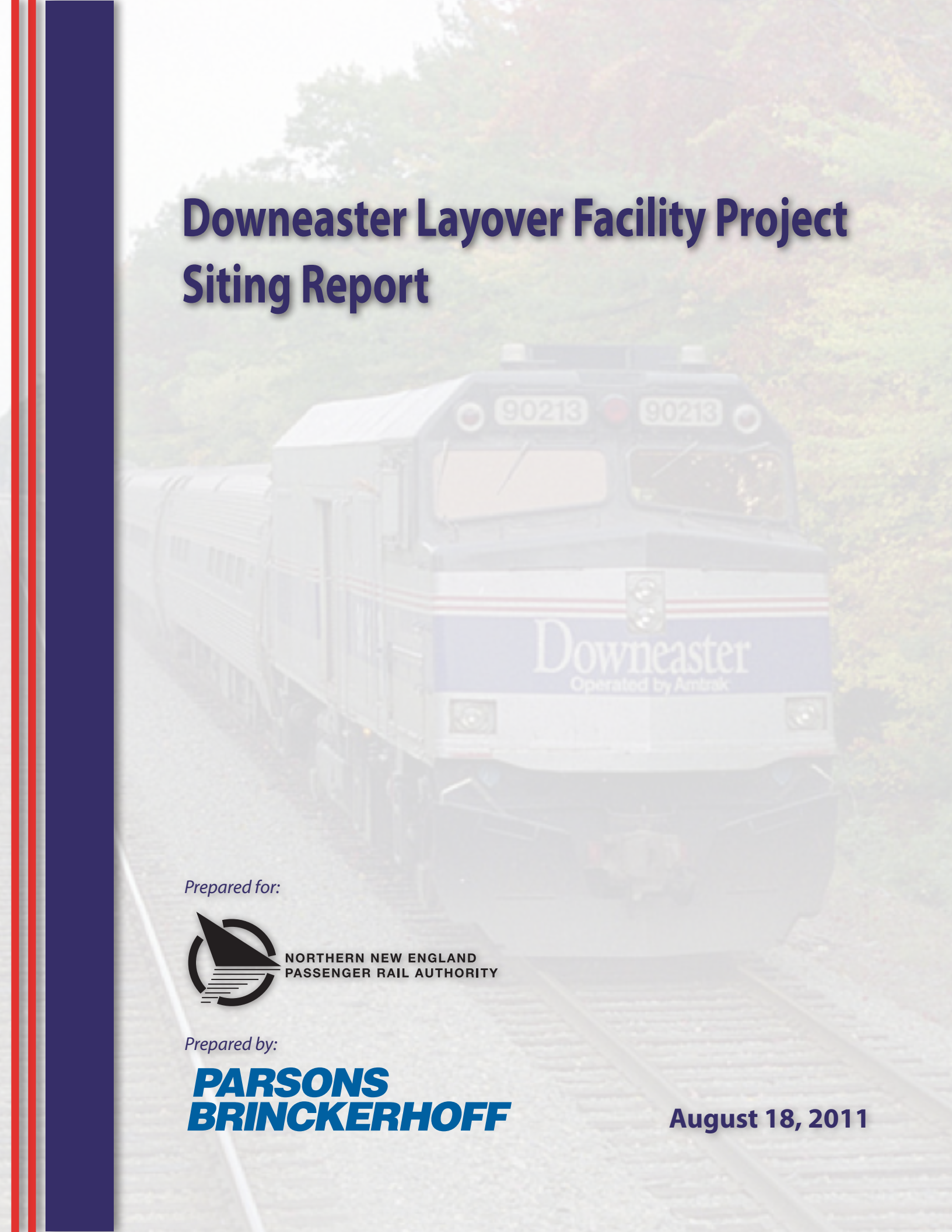
Brunswick Layover Environmental Assessment (EA)

Appendix B: Downeaster Layover Facility Project Siting Report

September 2013

Downeaster Layover Facility Project Siting Report



Prepared for:

NORTHERN NEW ENGLAND
PASSENGER RAIL AUTHORITY

Prepared by:

PARSONS BRINCKERHOFF

August 18, 2011

Downeaster Layover Facility Siting Report

1. Introduction

The Northern New England Passenger Rail Authority (NNEPRA) is in the process of extending the northern terminus of the Amtrak-operated *Downeaster* rail passenger service from Portland to Brunswick, Maine. The extension of service is anticipated to begin in late 2012. The purpose of this Report is to evaluate the suitability of several potential sites, located along the rail corridor in Brunswick Maine, for development as a *Downeaster* passenger train layover facility.

The layover facility is intended to encompass a set of railroad storage tracks and switches (termed "yard tracks") , a building incorporating these tracks to be used for the overnight storage (termed "layover") of rail passenger equipment, and ancillary components to accommodate daily service and maintenance functions associated with rail passenger equipment. As such, this facility will provide both storage (layover) and maintenance functions, although it is described herein as a layover facility.

The intent of this analysis is to address the need for relocating the layover facility from Portland to the new terminus at Brunswick, based on facility limitations at Portland and operating issues, and to compare the physical and functional merits of several potential layover facility sites identified at Brunswick.

Two public meetings have been held in Brunswick to discuss the requirements for the layover facility and associated operational issues, and to obtain input from the public and elected officials concerning the location of the facility. A third meeting is being held to discuss the findings of this Report.

2. Need for Action

At present, the *Downeaster* train sets operating between Boston and Portland are serviced and stored overnight at a layover facility in Portland, located adjacent to the passenger rail and bus station. The configuration of this facility is problematic in terms of size and lack of covered facilities, although the service operator (Amtrak) and the private contractor responsible for train maintenance have achieved highly satisfactory results despite the limitations imposed by the site. Overnight storage of the two train sets at the outlying Portland terminus is dictated by the operating schedule which provides early morning departures to Boston.

The overnight work that is performed on the train sets typically consists of replenishment of consumable items such as locomotive fuel and sand, potable water for passenger cars, and supplies for the food service cars. In addition, the passenger car interiors are cleaned and the restrooms are serviced and cleaned. Minor repairs (typically the repair or replacement of lights, interior car lights, brake shoes, air hoses, electrical and communications lines) can also be performed for the locomotives and passenger cars during the overnight layover.

The existing Portland site is an open air facility located behind the passenger station (Photo 1). All work is performed outdoors, and space for the associated railroad yard tracks is limited. This can hinder work on the train sets, particularly during the winter season. Maintenance personnel are slowed by working in cold, inclement weather while the cars and locomotives will become encrusted with snow and ice accumulation (Photo 2). Also, the occasional need for the shifting of train sets and individual cars can be difficult given the limited amount of available track space.

Photo 1: Portland Layover Facility

Photo 2: Winter Working Conditions

The pending extension of service northwards to Brunswick may result in the use of up to three train sets, as opposed to the present two sets of equipment, which would further strain operation of the existing Portland facility. Moreover, the need to have up to three train sets available at Brunswick for the first southbound trips in the morning would require each train set to travel 29 miles between a Portland layover site and the Brunswick station as a non-passenger carrying (or “deadhead”) movement. The situation would be repeated in the late evening with the train sets having to deadhead from Brunswick back to Portland after completing their last outbound runs from Boston. In addition to incurring additional operating costs and wear-and-tear on the equipment, these deadhead movements would reduce the amount of time available overnight for servicing of the equipment.

During the period when the trains are in operation, the proximity of the layover facility to the passenger station would allow for arriving trains to be moved to the facility for a “turnaround” servicing, including the removal of trash and re-stocking of the café car prior to the next southbound departure for Boston. While performing such servicing activity while the train remains in the passenger station is possible, it is not preferred since it can interfere with passengers and requires maintenance personnel to travel to the station from the layover facility. Given these considerations, the extension of the service beyond Portland to Brunswick necessitates a layover facility in Brunswick that is located near the passenger station. Moreover, this provides the opportunity for a new, better equipped layover facility.

3. Facility Requirements

As envisioned by NNEPRA and Amtrak, the layover facility will include:

- A building spanning three tracks accommodating up to three train sets, to be used for overnight indoor layover and allowing for all cleaning, servicing and repair work to be performed indoors. Tracks will access the building via “rollup” type overhead doors which will remain closed when trains are in the building.
- An arrangement of yard and track switches allowing for each train set to be stored in the building on its own track, and also allowing for the storage (outdoors) of a few spare passenger cars. The building and yard tracks will have a “double-ended” configuration to allow for trains to arrive or depart in either direction.
- Office, accommodation and storage space within the building for the Amtrak train crews, the train maintenance workers and the catering employees. On-site parking would be provided for approximately 30 employees.

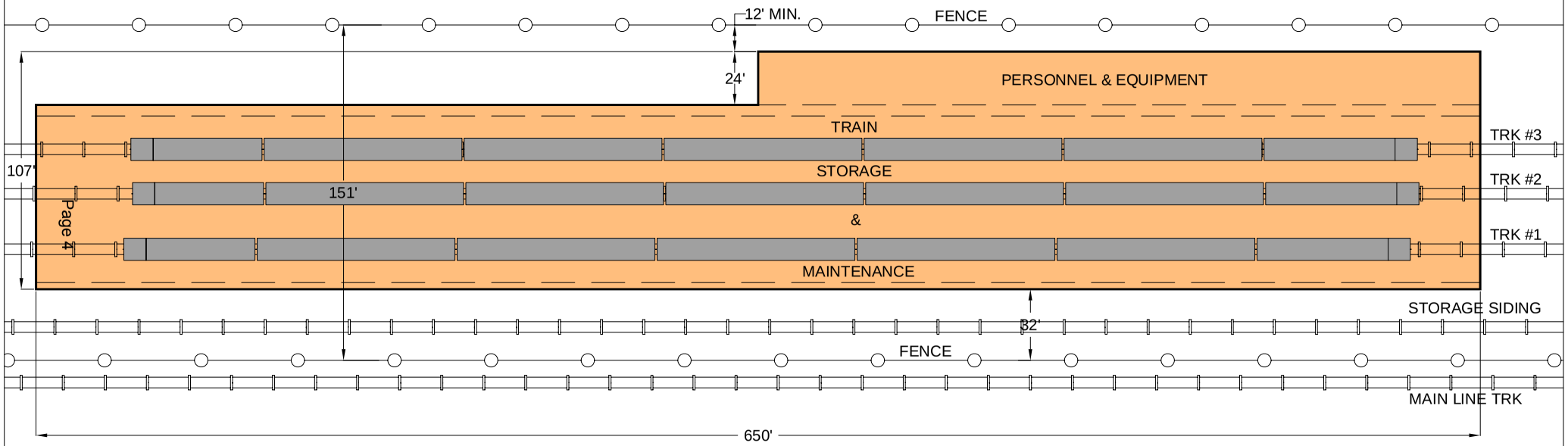
The layout of the facility is depicted in Figure 1 (see Page 4). The building will include indoor storage areas for the inventory of items needed to accomplish the maintenance and repair activities. There will be no on-site storage of diesel fuel supplies. Locomotives will be re-fueled by truck, with the tank truck discharging directly into the locomotive fuel tank via a hose connection. Sufficient space will be provided in the building to allow for the re-fueling to be accomplished inside.

Service for the Brunswick Extension will be operated using up to three train sets, with each set consisting of a maximum of one locomotive, five passenger cars and a (non-powered locomotive) cab control car, resulting in a total train length of approximately 570 feet to be accommodated in the building. NNEPRA and Amtrak have determined that, for the foreseeable future, the provision of additional passenger carrying capacity on the *Downeaster* would be achieved by operating no more than three train sets on faster and more frequent schedules, as opposed to creating longer trains with additional cars. Thus, sizing the facility to accommodate three, five-car train sets is deemed to be sufficient for envisioned future operations.

The trains are set up for bi-directional operation which eliminates the need for turning the entire train at the end of its run, either via a loop track or via a three-leg wye track configuration. The locomotive is positioned at the outbound end on the train while the cab control car is located at the inbound end of the train. This so-called “push-pull” operating regimen allows for a compact layover facility and is also fully compatible with the MBTA commuter rail operating system, within which the *Downeaster* operates at its southern terminus.

On occasion, it becomes necessary for Amtrak to substitute a malfunctioning cab control car with the powered locomotive for the inbound trip to Boston where repairs can be made to the control car. In order to achieve this, the locomotive is reversed around a wye track so that it can be positioned at the inbound end of the train for the trip to Boston. Location near a wye track also allows the opportunity to turn coaches to equalize wheel wear. It is therefore desirable that a wye track arrangement be available near the Brunswick layover facility.

DOWNEASTER BRUNSWICK STORAGE AND MAINTENANCE FACILITY
MAINTENANCE BUILDING



Legend

Rail Yard Track

Building

10 0 10 20

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Figure 1

4. Potential Layover Facility Locations – Initial Screening

Although NNEPRA, in consultation with Maine DOT, had initially identified a potential location for the facility, six sites adjacent to the existing rail corridor were ultimately identified, with locations ranging from 1.4 miles west of the Brunswick Rail Passenger Station to 4.1 miles east of the Station, as shown on the accompanying Figure 2 on Page 6. These sites are, from west to east:

- Brunswick Industrial Park (1.4 miles west of the Station)
- Brunswick West (0.5 miles west of the Station)
- Naval Air Station Brunswick (1.4 miles east of the Station)
- 175 Bath Road (2.2 miles east of the Station)
- Brunswick East (3.0 miles east of the Station)
- 393 Bath Road (4.1 miles east of the station)

Based on applying the previously identified track and building layout requirement for the layover facility, two sites were considered to be of insufficient size and configuration, namely 175 Bath Road and 393 Bath Road. In both cases, the available parcels are of insufficient size and development of the layover facility would require additional takings of adjacent residential and commercial properties. See Appendix A for site layouts.

Utilization of the Naval Air Station (NAS) site would require construction of a new grade crossing across Bath Road, in conjunction with a steeply graded connecting track from the existing rail corridor across Bath Road into the NAS (See Appendix A for site layout). Moreover, development of a railroad storage and maintenance facility on the NAS site may not be viewed as being in conformance with redevelopment plans for the NAS. For these reasons, it was determined to eliminate the NAS site from further consideration.

5. Potential Layover Facility Locations – Final Candidates

The screening process resulted in three sites remaining under consideration:

- Brunswick Industrial Park
- Brunswick West
- Brunswick East

The **Brunswick Industrial Park** site refers to an undeveloped area of land, situated to the north of the existing railroad main line (on Pan Am's Brunswick Branch), and adjacent to the Brunswick Industrial Park, as seen in Figure 3, Page 8.

The terrain slopes steeply down from the railroad trackbed, and consequently, an extensive amount of filling and grading would be required in order to prepare the site for construction of the layover facility. The situation is further complicated by the presence of waterways and associated wetlands within the area. It is estimated that the cost for the site preparation work unique to this location would be in the range of $1.3 million. Property acquisition costs are unknown at this time.

DOWNEASTER BRUNSWICK LAYOVER AND MAINTENANCE FACILITY
POTENTIAL SITE LOCATIONS

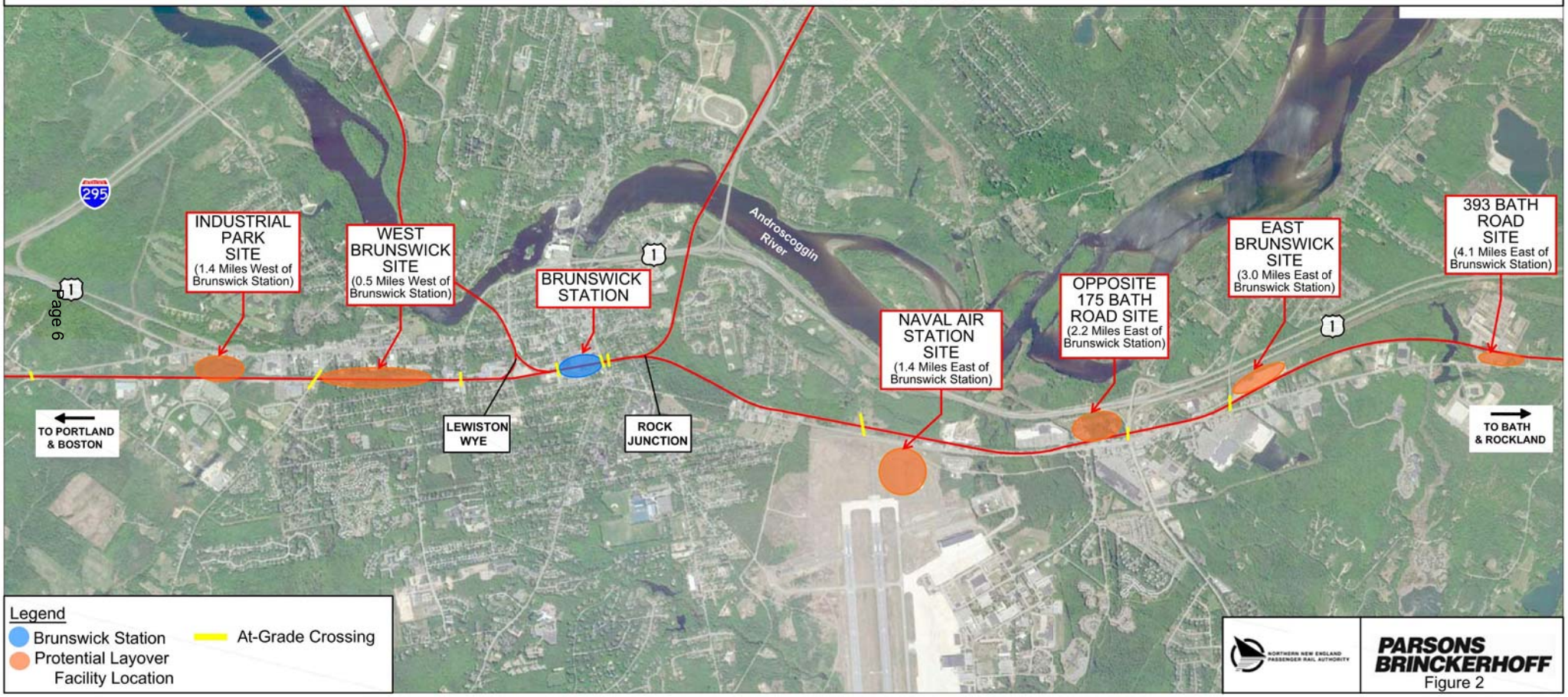

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Figure 2

The **Brunswick West** site is comprised of the former Brunswick rail freight yard located on the north side of the railroad corridor between Church Road and Stanwood Street, as seen in Figure 4, Page 9. The freight yard originally consisted of numerous siding tracks with a total capacity of 95 freight cars (according to Maine Central Railroad Operating Rulebook dated May 14, 1978). Several wood frame railroad office, storage and crew buildings also once occupied the perimeter of the site.

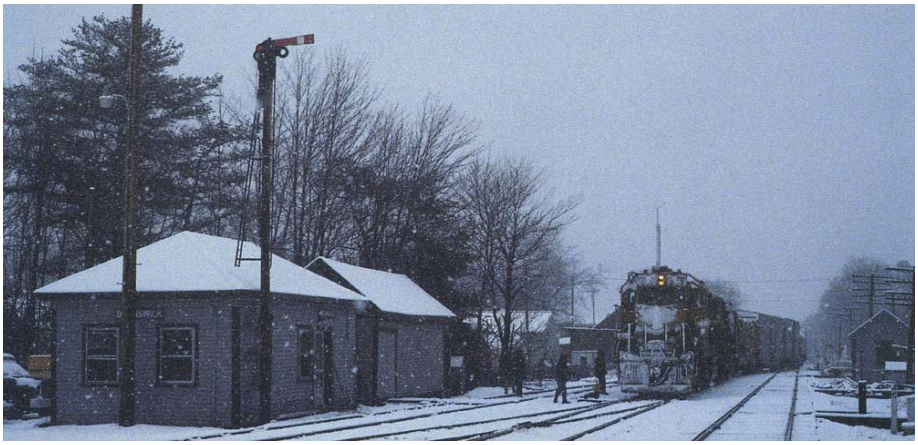


Photo 3: Brunswick Yard circa 1981 – Train arriving from Rockland Branch

The Brunswick Yard served as the interchange point for freight between the Maine Central's Lower Road main line and the Rockland and Lewiston Lower Branches. The railroad buildings have been removed along with much of the yard track. The location continues to function as a freight interchange location for Pan Am Railways and Maine Eastern Railroad. The site is presently being acquired by NNEPRA. If not selected as the site of a layover facility, NNEPRA may still choose to construct holding tracks at this location support passenger train operations service and/or the site may be utilized to enhance freight operations.

The cost of acquiring the property is approximately $269,000, and site preparation costs are anticipated to be minimal.

The **Brunswick East** site is comprised of a presently vacant set of parcels located along Bath Road at the northeast corner of the intersection with Old Bath Road, also known as Cooks Corner, as seen in Figure 5, Page 10. The site is screened from Bath Road by a row of commercial buildings with trees situated between the existing buildings and the railroad corridor. According to the owner, the site was cleared of trees and accompanying vegetation several years ago, with all necessary utility connections being available on-site. The flat graded site appears suitable for development as a railroad layover facility and has been offered for sale by the owner. Property acquisition costs are unknown at this time, while site preparation costs are anticipated to be minimal.

The one significant construction element occurring beyond the facility site would be the installation of a track switch just west of Old Bath Road, with a resulting second track added to the grade crossing. This arrangement is necessary in order to allow the train crew to stop and operate the track switch connecting to the main line (which allows the train to enter the layover facility) without blocking the highway crossing while this operation occurs.

DOWNEASTER BRUNSWICK STORAGE AND MAINTENANCE FACILITY

INDUSTRIAL PARK SITE

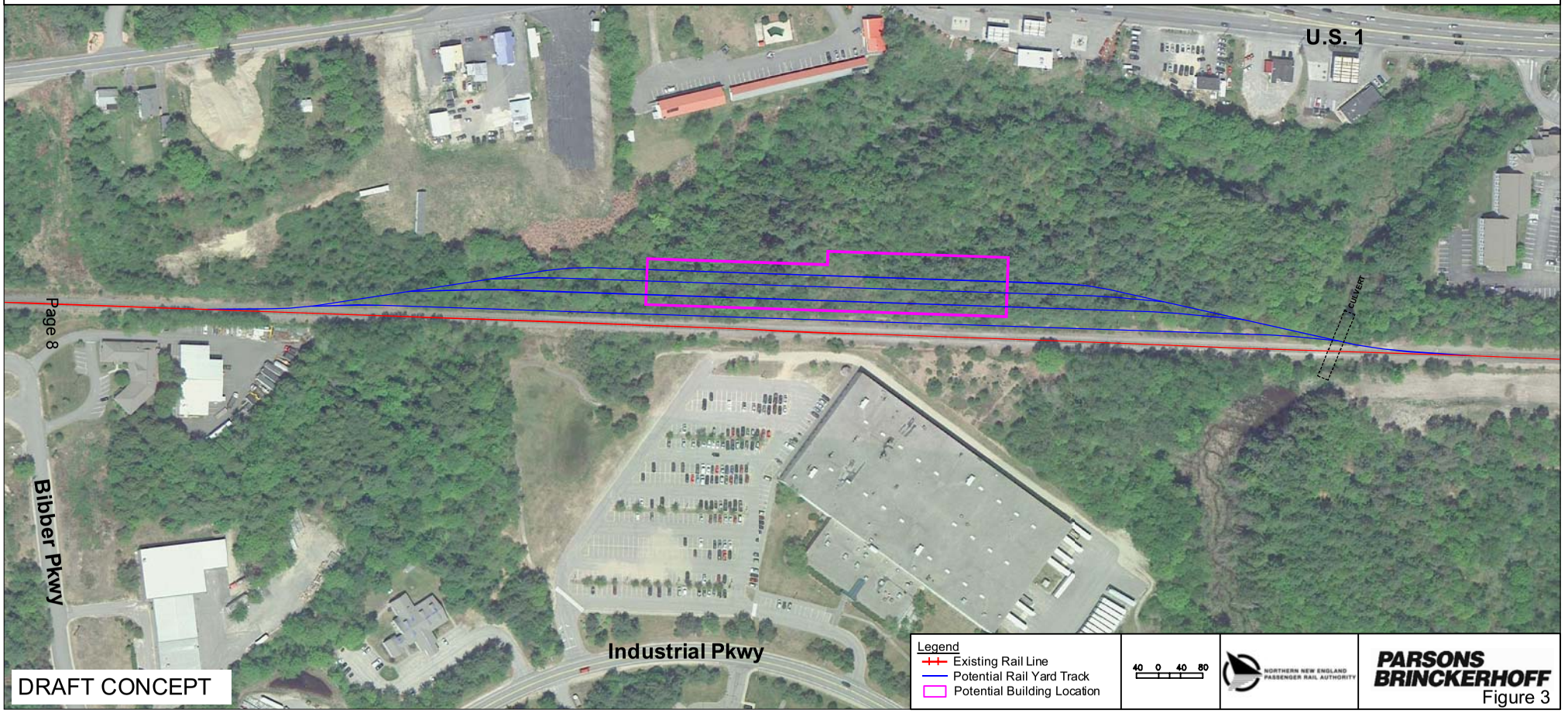
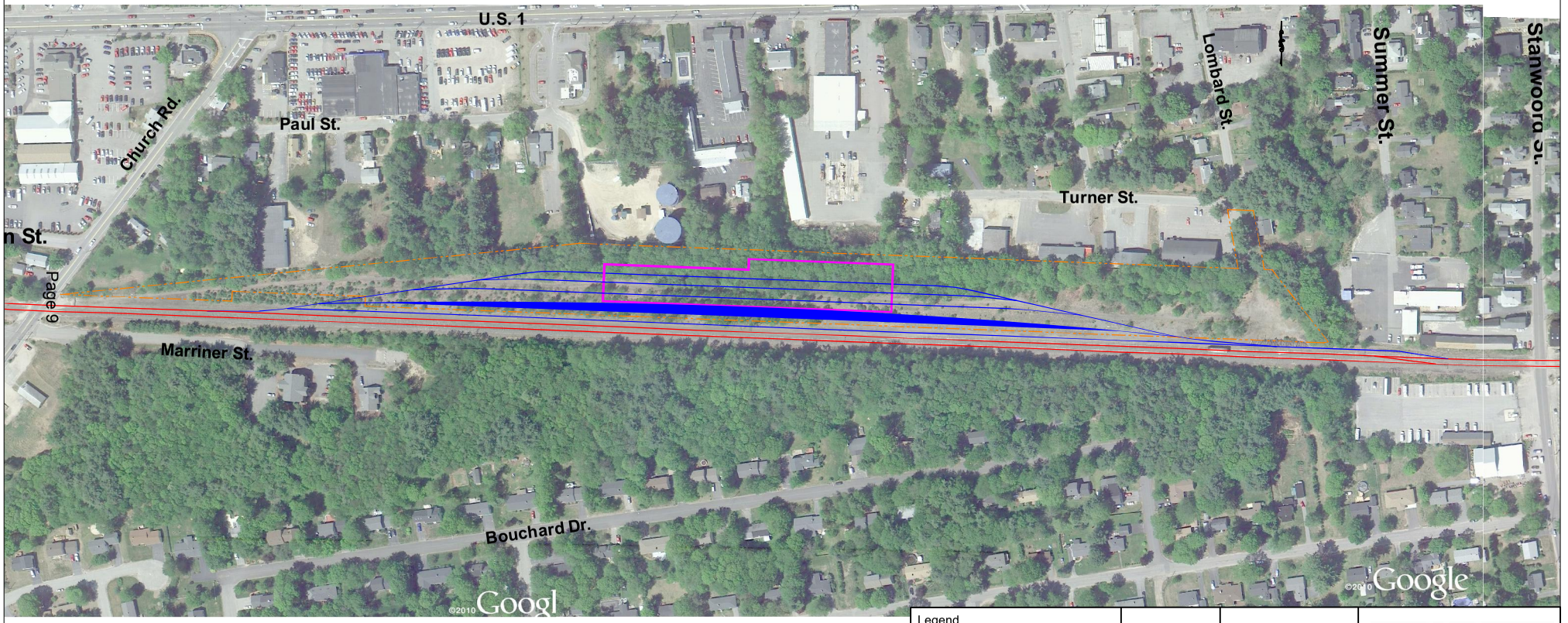


Figure 3

DOWNEASTER BRUNSWICK STORAGE AND MAINTENANCE FACILITY

BRUNSWICK WEST SITE



Legend
- Existing Rail Line
- Potential Rail Yard Track
- Potential Building Location

50 0 50 100

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DRAFT CONCEPT

Figure 4

DOWNEASTER BRUNSWICK STORAGE AND MAINTENANCE FACILITY

BRUNSWICK EAST SITE

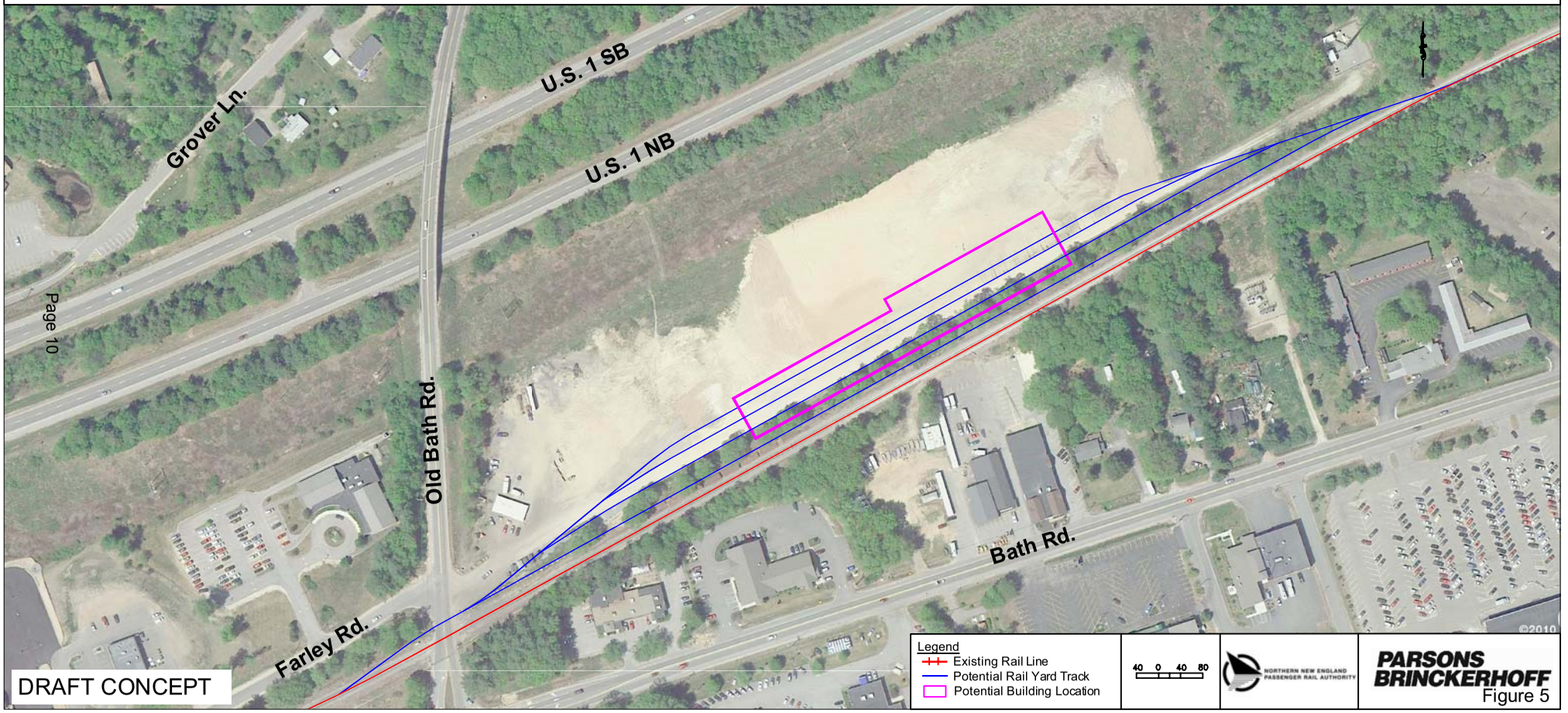

Figure 5

6. Evaluation of Sites

Site Characteristics

Topography

Brunswick Industrial Park: The terrain slopes steeply down from the railroad trackbed into several water drainage courses. An extensive amount of filling and grading would be required in order to prepare the site for construction of the layover facility.

Brunswick West: This site is a large, linear parcel that sits on level ground. From a topographical perspective, it is well suited to house the layover facility and would require minimal earthwork to prepare the site.

Brunswick East: This site is a large, linear parcel that sits on level ground. It is cleared of vegetation and from a topographical perspective, it is well suited to house the layover facility and would require minimal earthwork to prepare the site.

Environmental Considerations

Brunswick Industrial Park: Consultation with the Town of Brunswick indicates that previous development planning for this location revealed the presence of habitat areas. Water courses and wetlands of undetermined quality have been identified on the site. There is no evidence of prior disturbance (development) at the site, nor of any site contamination.

Brunswick West: The site has been in use for railroad activities for decades. Investigations by Maine DOT have indicated the presence of coal ash at this location (not an unusual condition for long-term railroad facilities). There is no evidence of fuel contamination or any other hazardous substances which would hamper development of this site. A small waterway or wetlands feature has been identified at the eastern side of the site, though is unlikely to be disturbed by construction activities.

Brunswick East: The site has not been investigated in detail for presence of environmental features of concern or contamination, but does not show visible evidence of either.

Setting, Land Use, and Access

Brunswick Industrial Park: The site is comprised of multiple parcels. Construction of a layover facility would require acquisition of undeveloped portions of six properties, which currently are developed with frontage along Route 1. The site is generally bordered by undeveloped areas, a mix of commercial uses and a large distribution center. A motel is located along Route 1 approximately 250 feet north of the potential building location, but no other residential uses have been identified nearby. The land is currently zoned Industrial 4 and Highway Commercial 1. The layover facility would be a permitted use under current zoning and the Town of Brunswick has indicated that the proposed facility is consistent with the vision for this area as described in the Comprehensive Plan.

Roadway access could be provided via the Industrial Park parking lot (including a new at-grade crossing of the railroad main line) and from US Route 1. Based on undeveloped nature of this location, additional work would be required to bring utilities into the site.

Brunswick West: This site was previously developed as a rail freight yard. One siding track remains in use today. Properties to the north of the site are primarily a mix of industrial, commercial and residential uses, including a fuel storage facility. An industrial park is located to the west across Church Road. To the south, the site is bordered by a residential neighborhood, which has concerns for potential impacts associated with air and noise emissions from the facility in addition to visual impacts of the layover building. The site is zoned Commercial 1 and 2, and Mixed Use 2- Intown Railroad Corridor. Continued use and development of this site for railroad transportation activities is consistent with the Town of Brunswick's zoning and with its Comprehensive Plan; the contemplated layover facility is deemed to be a permitted use by the Town.

Access to the site is likely to be provided from Church Road, which provides access to nearby Route 1 at a signalized intersection. Utility connections are available on or adjacent to the site.

Given the presence of the neighborhood immediately south of the railroad corridor, noise, air quality and visual impacts are of potential concern. Noise and air quality issues associated with the layover facility are presented subsequently in this report.

Brunswick East: The undeveloped site is located with the Cook's Corner Zoning District, which allows a mix of retail, office and residential uses. Industrial uses, such as the layover facility, are allowed only by special permit. The Cook's Corner Master Plan establishes a vision for a mixed use commercial hub in this area, and Town staff has indicated that a layover facility would not be consistent with current zoning nor the vision established by the Comprehensive Plan and Master Plan.

Access to the site would be provided from Old Bath Road, which provides access to nearby Bath Road (Route 24) at a signalized intersection. Due to the need to install a track switch west of Old Bath Road, a second track and new signals would be added to the grade crossing to allow the train crew to stop, impacting both traffic and costs at this site. Utility connections are available on-site.

Operational Analysis

Given the need for *Downeaster* trains to depart from the layover facility during early morning hours, return to the facility during the late evening travel, and make round trips between the facility and Brunswick Station for mid-day turnaround servicing, an analysis was made of the so-called "non-revenue" trip travel times between each of the candidate sites and the station. This analysis utilized a spread-sheet methodology incorporating track speeds and geometry, train performance specifications, operating rules, and the logistics associated with operating track switches, etc. (See Table 1).

The differences in travel times and distances among the candidate sites translate directly into operational costs associated with crews, equipment and fuel utilization, and overall schedule reliability. Accordingly, these differences should be of prime concern to NNEPRA in selecting a layover facility site.

Of particular concern is the Brunswick East site, located approximately three miles east of the Brunswick Station. In order to reach this facility, *Downeaster* trains would have to proceed beyond the signaled tracks, controlled and dispatched by Pan Am Railways, and enter onto a section of non-signaled tracks which are controlled by the Maine Eastern Railroad. This transition occurs at Rock Junction, approximately ¼ mile east of Brunswick Station. Given the need to transition from signaled to non-signaled operation, the change in dispatching control, and the distance involved, it is estimated that the time to traverse this route between Brunswick Station and the layover facility would be 32 minutes, as seen in Table 1. It should be noted that Amtrak will likely allocate 40 to 45 minutes for this trip to allow for potential on route delays that could otherwise delay the first station departure. This is likely to have significant impacts on operating costs and could preclude the opportunity of performing mid-day "turnaround" servicing at the facility. See Table 2 for a summary of non-revenue operations between Brunswick Station and the potential layover facility sites.

Table 1: Elements of Movement to Storage Facility

	T_{total}	T_{clear}	Max V.	T_t	Max V.	T_{switch}	Max V.	T_{enter}	Max V.
	(min.)	(min.)	(MPH)	(min.)	(MPH)	(min.)	(MPH)	(min.)	(MPH)
Industrial Park	**12**	0	0	5	25	5	0	2	6
Brunswick West	**10**	0	0	3	10	5	0	2	6
Brunswick East	**32**	15	0	10	25	5	0	2	6

T_{total} = Total time from dispatch request to arrival in the layover facility
T_{clear} = Time to obtain clearance from dispatcher
T_t = Travel time from station to switch to enter storage facility
T_{switch} = Time to throw switch to align turnout into storage facility
T_{enter} = Time to enter the storage facility
Max V = Maximum speed (velocity)

Table 2: Non-Revenue Operation between Brunswick Station and Layover Facility Sites

	Industrial Park	Brunswick West	Brunswick East
Grade Crossings Traversed	3	2	7
Miles from Station - Signaled	1.4	0.5	0.3
Miles from Station – Non-Signaled	0	0	2.7
Daily Train Miles			
Initial[1]	16.8	6.0	36.0
Ultimate[2]	25.2	9.0	54.0
Time from Station (min)	12	10	32
Daily Train Hours			
Initial[1]	2.4	2.0	6.4
Ultimate[2]	3.6	3.0	9.6

[1] Based on three departures to Brunswick Station in the morning and three arrivals from the Station in the evening, plus two mid-day trips to and from the Station for turnaround servicing

[2] Based on five departures to Brunswick Station in the morning and five arrivals from the Station in the evening, plus four mid-day trips to and from the Station for turnaround servicing. This reflects an operating schedule for the *Downeaster* which NNEPRA plans to implement in the future.

Also of concern are the number and locations of highway grade crossing which would be traversed by every train movement to and from the facility. A listing of these crossings with Average Annual Daily Traffic volumes (AADT) and identification of which of the potential sites are impacted by each crossing is provided in Table 3.

Additional train service provided on the existing tracks will translate to an increased amount of time that vehicles are stopped at at-grade railroad crossings. Currently, there are eight grade crossings in Brunswick. Data was obtained using the FRA Rail Crossing Inventory, which includes AADT volumes collected between 1997 and 2005. These traffic volumes were compared to available counts from the MaineDOT Traffic Count Inventory on nearby routes, which have remained fairly stable over the past several years, and therefore the volumes collected for FRA are still representative.

Table 3: FRA Crossing Inventory

Mile Post	Grade Crossing	Annual Average Daily Traffic (AADT) Volume	Industrial Park	Brunswick West	Brunswick East
28.03	Church Rd	2,987	✓		
28.68	Stanwood St.	6,830	✓	✓	
29.12	Union St.	5,494	✓	✓	
29.32	Maine St.	19,300			✓
29.35	Park Row	290			✓
30.54	Jordan Ave	3,071			✓
31.74	Ramp B to US 1	20,363			✓
32.21	Old Bath Road	5,558			✓

A final concern is the proximity to each of the candidate layover facility sites to the wye track arrangement which serves as the connection to the Lewiston Lower Branch. As was noted previously, access to such an “equipment turning” facility is highly desirable in the event of a disabled piece of operating equipment. Such events are unplanned, so the proximity of the wye to the layover facility is of prime importance in order to recover and minimize any impacts on train schedules.

The locations of the above discussed sites and features are depicted on the accompanying Figure 6.

DOWNEASTER BRUNSWICK LAYOVER AND MAINTENANCE FACILITY
POTENTIAL SITE LOCATIONS- FINAL CANDIDATES

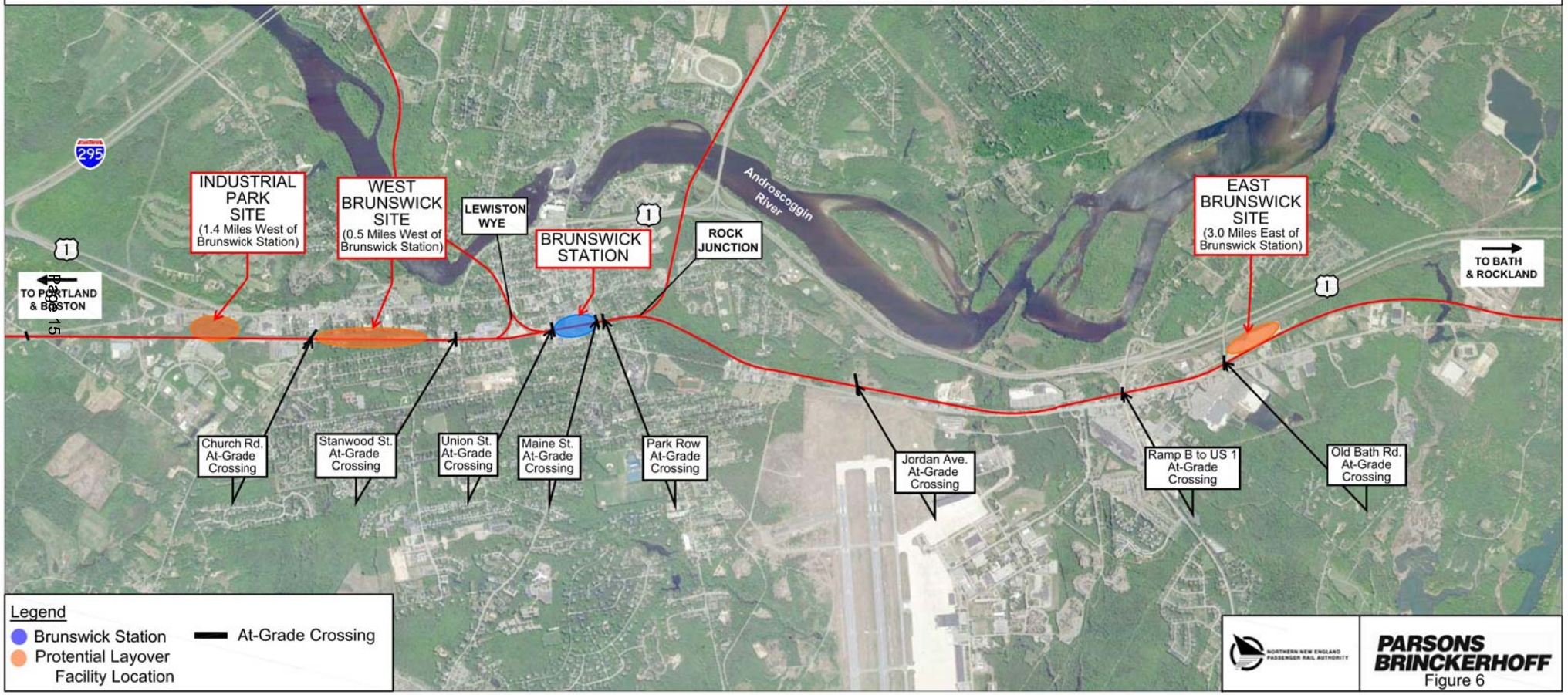

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Figure 6

Air Quality

The proposed layover facility would service and store rail cars and locomotives. Primarily, the facility would store up to three trains in a heated space so that the locomotive engines could shut down at night during cold weather periods. Locomotive emissions, therefore, would be generated within the facility mostly during locomotive start-up periods in the morning and while idling for restocking and cleaning during brief visits during the day.

The proposed facility would be located near tracks that are being used by existing excursion and freight trains. Emission sources from the proposed facility would include:

- Six (three round-trip) *Downeaster* trains passing the site each day;
- One to two freight trains passing the site each day;
- Three *Downeaster* trains stored overnight within the proposed layover/maintenance building;
- Three trains returning to the facility during the day for cleaning and restocking; and
- The HVAC system of the layover/maintenance building, which will maintain the temperature inside the facility overnight at 45 degree Fahrenheit or higher.

A conservative (screening-level) air quality analysis was conducted, using the facility's schematic layout and the distance to nearby sensitive land uses, to estimate the potential air quality impacts of these emissions.

Pollutants of Concern

Criteria pollutants (i.e. pollutants for which national ambient air quality standards [NAAQS] have been established) and non-criteria toxic air contaminants (TACs) for which health risk values were developed by the U.S. Environmental Protection Agency (EPA) were considered in this analysis of potential localized impacts. The criteria pollutants considered are:

- Nitrogen dioxide (NO_2) from the diesel locomotives and the gas-fired HVAC system, and
- Particulate matter smaller than 10 microns (PM_{10}) and particulate matter smaller than 2.5 microns ($PM_{2.5}$) from diesel locomotives.

There are also a number of toxic pollutants that are either carcinogenic or non-carcinogenic that can also be potentially released from diesel engines of the locomotive exhausts and stack (vents) of the gas-fired HVAC system of the maintenance building. These pollutants have the potential to cause cancer and other adverse health problems, including respiratory illnesses, and increased risk of heart disease.

Analysis of the representative TAC's were therefore conducted that considered both (long-term) carcinogenic and chronic non-carcinogenic and acute (short-term) health risks. For these analyses, PM_{10} emission factors were used to represent diesel PM.

Emission Factors and Rates

Emissions factors from the locomotives were estimated as follows:

- Diesel particulate matter, PM_{10}, $PM_{2.5}$, and NO_2 emissions from locomotives were estimated assuming emission standards applicable for old locomotives (i.e., manufactured before

2002), and locomotive emission rates were estimated based on a General Electric P42 diesel locomotive model, and appropriate notch settings, activity times, and idling durations;

- Emissions from the HVAC system of the maintenance building were estimated using EPA's "Compilation of Air Pollutant Emission Factors" (AP-42) emission factors for a natural gas system;
- TAC emitted from locomotive diesel engines were estimated using EPA AP-42 emission factors for speciated organic compounds for large stationary uncontrolled diesel-fuel engines (Table 3.4.-1 and 3.4.-3).
- TAC emitted from the HVAC system were estimated using EPA AP-42 emission factors for speciated organic compounds from natural gas combustion.

Emission rates for the locomotives were estimated based on the following operating scenario:

- Three trains would arrive in the evening, be stored overnight in the layover facility building and depart in the morning;
- During the day, three trains would spend about 30 minutes idling within the facility for cleaning and restocking;
- One freight train a day travel would travel through the project area on the existing extended siding and one train every two days would travel by the project area on the new siding;
- The *Downeaster* trains would idle for 30 minutes inside the building and will be moving in the project area for approximately 30 minutes over a 24-hr period (with the locomotive engines going through all notches [gears]); and
- The freight trains would be moving in the project area for approximately 30 minutes over a 24-hr period (with the locomotive engines going through all notches [gears]).

Dispersion Modeling

As the operation of the layover facility has the potential to cause health impacts on nearby sensitive land uses due to emissions from the locomotives and HVAC system, a conservative (preliminary) dispersion modeling analysis was conducted. EPA's AERMOD atmospheric dispersion model was used to simulate physical conditions and predict pollutant concentrations at nearby receptor locations.

AERMOD is generally applied to estimate impacts from simple point-source emissions from stacks, as well as emissions from volume and area sources. The model accepts actual hourly meteorological observations and directly estimates hourly and average concentrations for various time periods. Regulatory default options and the rural dispersion algorithm of the AERMOD model were conservatively used in the analysis.

A cartesian grid network was developed around the facility that includes the rail tracks and the maintenance building. Based on a sketch of the prototypical facility, the closest sensitive land uses are approximately 175 feet from the existing mainline track. Therefore, the first row in cartesian grid was placed at 175 feet south from the facility. However, the maximum concentrations found at 175 feet (or more) from the facility in any direction were used to estimate facility maximum potential impacts. These values were then added to estimated background values for the project area, and total concentrations compared with applicable federal air quality standards and health-related guideline values.

Emissions from locomotive train operations were simulated as area sources and emissions from the maintenance building's HVAC system were simulated as a point source. An emissions release height was assumed to be 15 feet to approximate the height of the locomotive exhaust, and 33 feet to approximate the overall height of the maintenance building. Meteorological data from Boston Logan Airport were used for analysis.

Health Risk

The maximum estimated concentrations of representative TACs were used to calculate cumulative cancer risks, chronic non-cancer and acute hazard indexes associated with layover facility operations.

Cancer Risk

From the multiple pollutants that may be emitted from locomotive diesel vehicular exhaust and gas-fired HVAC system operations, four pollutants are considered by EPA as carcinogens for which cancer unit risk factors were developed. These are benzene, acetaldehyde, formaldehyde, and acrolein. The maximum individual cancer risk for each pollutant and total incremental cancer risks associated with these pollutants releases were calculated. Metal elements bounded to PM from natural gas combustion, such as arsenic, cadmium, nickel, and others, were considered as part of the PM_{10}.

The cancer risk calculation procedure, methodology and equations were based on the EPA Human Health Risk Assessment Protocol (HHRAP, Appendix B, Tables B-5-1 and C-2-1), together with EPA approved health values for cancer risk assessments.

Chronic Non-cancer Hazard Index

Pollutants considered are those for which non-cancer RfC (reference dose concentration) guideline values are available from EPA's Integrated Risk Information System (IRIS) or Prioritized Chronic Dose-Response Values for Screening Risk Assessments (EPA, Table 1, June 2007).

Calculations of chronic non-cancer hazard index were based on the HHRAP, Appendix B, Tables C-2-1 and C-2-2) methodology and equations.

Acute Hazard Index

Acute hazard index analysis was based on HHRAP methodology and equations (HHRAP Appendix C, Table C-4-1 and B Table B-6-1).

Air Quality Analysis Results

Criteria Pollutants

Total estimated concentrations of the criteria pollutants are provided in Table 4. As shown, the layover facility's emissions of the criteria pollutants would not cause an exceeding of NAAQS.

Table 4: Total Estimated Concentration of the Criteria Pollutants

Pollutant	Time Period	NAAQS (ug/m3)	Estimated Impacts (ug/m3)	Background Conc. (ug/m3)*	Total Estimated Concentrations (ug/m3)	Exceed NAAQS?
NO_2	Annual	100	23.4	22.6	46	No
PM_{10}	24-hr	150	4.0	56.0	60	No
$PM_{2.5}$	24-hr	35	3.8	20.2	24	No
	Annual	15	0.8	10.42	11	No

*These are the highest values recorded at any of the State's ambient monitors in Portland Maine in 2008.

Toxic Pollutants

Cancer Risks

Incremental cancer risks were estimated using the maximum concentrations found at the 175 feet or more from the facility. Based on the results of this analysis, it was determined that the overall incremental cancer impacts from all pollutants combined would be below the applicable significant threshold of one in-one million, and, therefore, is not considered to be significant.

Chronic Non-cancer Risk

The total chronic non-cancer hazard index found at a distance of 175 feet or more from the facility is estimated to be less than 1. As such, potential chronic non-cancer risks associated with the facility's operations are not considered to be significant.

Acute Risk

The total acute hazard index found at the 175 feet or more from the facility is estimated to be less than 1. As such, potential acute health risks associated with the layover facility operations are not considered to be significant.

Air Quality Analysis Conclusions

The result of these analyses are that the potential air quality impacts associated with emissions of the criteria and toxic pollutants releases from layover facility operations are the following:

1. Maximum estimated criteria pollutant concentrations at nearby sensitive land uses are within (do not exceed) the NAAQS and, as such, project impacts are not considered to be significant;
2. The total chronic non-cancer hazard index is less than threshold value of 1 and, therefore, is not considered to be significant;
3. The total acute hazard index is less than the threshold value of 1 and, therefore, is not considered to be significant; and
4. Total incremental cancer risk found is less than 1 per million and, therefore, is not considered to be significant.

Noise & Vibration

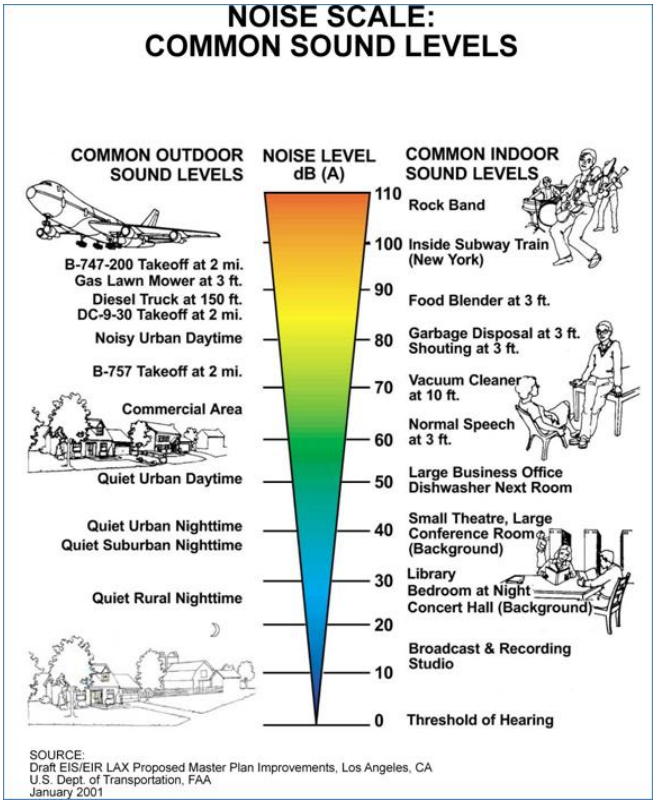
Concern has been expressed about noise and vibration that might be generated by various components of the proposed passenger layover facility. These concerns include noise and/or vibration from:

- Passenger train passbys of various land uses adjacent to the main line railroad tracks
- Blowing of train horns when approaching highway/railroad at-grade crossings
- Three trains that would be stored overnight, with a 30 minute pre-departure idling period housed, on tracks located within the layover building constructed adjacent to the railroad main line tracks
- Safety test of each train's horn within the layover building in the morning as a pre-departure safety test as trains are prepared to be placed in service
- Noise from mechanical and ventilation systems associated with the layover building
- Train maintenance and/or cleaning activities conducted inside the layover building
- Employee and service vehicles associated with the layover building operations

<u>Generic Noise Analysis</u>

Using the FTA/FRA rail noise model, and by making several generic assumptions about ground conditions and train operations (i.e. one diesel locomotive, five cars and a control cab car moving at a maximum speed of 40 mph on the mainline six mainline trains per day, three arrivals and departures at the layover facility during the late night and early morning, two mid-day roundtrips to the facility for turnaround servicing , no loud track conditions, no shielding/barriers, and soft ground), the predicted noise levels from the *Downeaster* trains operating through the area would be approximately:

- 62 dBA DNL and 57 dBA Leq at 50 feet from the tracks
- 57 dBA DNL and 52 dBA Leq at 100 feet from the tracks
- 52 dBA DNL and 47 dBA Leq at 200 feet from the tracks
- 47 dBA DNL and 42 dBA Leq at 400 feet from the tracks



While it is impossible to determine noise impact from these generic noise levels without knowing the ambient noise levels at the receptor locations, it is safe to speculate that such train-generated noise levels would not pose significant noise impact conditions at community receptor locations.

The Federal Railroad Administration's Final Train Horn Rule (49 CFR Part 222)

mandates that a train sound its horn when approaching a highway/railroad at-grade crossings. Measurements of train horns obtained during a recent study indicates a sound level of approximately 104 dBA (maximum) at 100 feet from the tracks. The maximum horn level would be 98 dBA at 200 feet from the train horn and about 90 dBA at 400 feet away. This sound would be clearly audible at distances well beyond 400 feet and would likely be considered an unpleasantly loud sound within 400 feet of the train.

In addition to noise associated with moving trains, the layover facility will also generate noise. Up to three trains would be temporarily stored on siding tracks located within a proposed layover building constructed adjacent to the main line tracks. For this analysis one needs to consider the sound of a single stationary train with its engine at idle, plus two other trains, less the amount of attenuation (shielding) provided by the expected layover building's construction. The results of this hypothetical analysis yield a net noise level of about 58 dBA at 100 feet from the building, 52 dBA at 200 feet from the building, and 46 dBA at 400 feet from the building. Based on typical nighttime ambient noise levels in suburban to semi-rural residential communities, the sound of idling trains would likely be readily audible within 100 feet from the building, and then fade to unobtrusive to inaudible levels at a distance of about 200 feet or greater from the layover building.

The safety test of each train's horn within the layover building as trains are prepared to be placed in service would result in a brief maximum noise level of approximately 115 dBA inside the layover building. Accounting for the attenuation of the building with no additional sound control features, this would result in approximately 90 dBA sound level at 100 feet from the building, 84 dBA at 200 feet from the building, and about 78 dBA at 400 feet from the building. Consequently this may require a special noise control feature to be designed to reduce the horn test sound to an acceptable level exterior to the building.

Noise concerns related to operations of the layover building also include mechanical systems associated with the layover building such as ventilation systems and air handling equipment, activities conducted within the layover building such as light maintenance work, and noise generated exterior to the building from employee and service vehicles associated with the layover building operations.

Mechanical and HVAC systems noise from air compressors, pumps and similar devices are expected to be contained within the layover building. Mechanical noise (from exhaust blowers for example) is expected to produce a sound pressure level of 80 dBA at a distance of 3 feet from the source. Using a sound attenuation rate of 6 dBA for every doubling of distance from the source, the resulting sound pressure levels at 100 feet would be about 50 dBA, 44 dBA at 200 feet, and 38 dBA at 400 feet. This noise level will likely be masked by ambient noise at a distance of 200 feet or more from the building. Any ventilation fans required to penetrate through the building's walls or roof should be specified as larger, slow turning, quieter fans. Silencers and enclosures are also available options to reduce mechanical and ventilation noise sources.

Parking area noise will be predominantly generated by automobile and light duty truck activity, with an occasional larger delivery vehicle using the on-site parking areas. The typical noises generated by use of a parking area are associated with car door slams, engine starts, and slow-

speed vehicle movement. Slow speed light-duty vehicle movement would contribute negligible noise. Car-door slams and engine start-ups were previously measured for a variety of light-duty vehicle types. These sounds have an average maximum noise level of 69 dBA at a distance of 15 feet. At distances of 100 feet, 200 feet and 400 feet, the sound levels would be 52, 46, and 42 dBA, respectively. These very brief sounds would be unobtrusive or inaudible at the nearest noise-sensitive use in the vicinity of a layover building.

Generic Vibration Analysis

Using the FTA/FRA rail vibration model, a similar generic vibration analysis was performed by making several assumptions about ground conditions and train operations (i.e. one trainset, moving through at 40 mph, with no loud track conditions or unusual ground conditions leading to a wooden-framed house), the predicted ground-borne vibration levels from a commuter train passing through the area would be approximately:

- 77 VdB at 50 feet from the tracks
- 71 VdB at 100 feet from the tracks
- 65 VdB at 200 feet from the tracks
- 59 VdB at 400 feet from the tracks

The results indicate that while there might be some concern for receptors within close proximity of the tracks, it is unlikely that vibration impacts would be expected for receptors 100 feet or more from the tracks.

Noise and Vibration Conclusions

The results of this generic assessment of potential noise and vibration issues associated with the proposed layover facility indicate that while such concerns cannot be completely discarded, they are not expected to be significantly severe. Nevertheless, site-specific ambient measurements and carefully developed predictive models will need to be conducted in order to objectively and quantifiably conclude if project-related noise and/or vibration levels pose a concern to the community, and if so, the degree and extent of mitigating measures for the project.

7. Evaluation Summary

Site evaluation variables were developed based on requests for information from the general public and elected officials, requests from NNEPRA Board members, and based on information deemed important to the railroad operators. These variables summarize the analyses described in the previous sections. A weighting factor of High, Medium and Low was assigned to each criterion to reflect the relative importance of each factor.

- Availability of Land – identifying the availability of the real property to be acquired for the site, and any additional takings or easements (MEDIUM)
- Topography – identifying present configuration of the site and any preparatory work needed prior to construction of the facility (HIGH)

- Hazardous materials – identifying potential for a site to contain oil / hazardous materials. Note that the project does not plan any major excavation of material from the selected site (MEDIUM)
- Availability of Utility Connections – identifying if a site has utility connections and access. The consultant team had to evaluate available utility connections based on existing development at or adjacent to the site. (LOW)
- Proximity of Residences (number of residences within a ½ mile radius of the proposed site) – identifying potential for impacts due to noise, air quality and visual factors (HIGH)
- Land Use Compatibility – identifying compatibility with existing zoning and any adopted planning documents (HIGH)
- Railroad Operations – identifying travel times and distances between the facility and Brunswick Station, associated operational costs and impacts on other rail operations (HIGH)
- Roadway Connections – identifying access to arterial roadways. So long as a suitable access connection is possible, this is not considered a key factor due to very low traffic volume generated by the layover facility (LOW)
- Traffic Impacts – identifying grade crossings in terms of AADT and the number of times each crossing would be traversed daily by trains proceeding to and from the layover facility (MEDIUM)

Based on the evaluations described in this report, the following scoring was assigned (unweighted scores):

Table 5: Unweighted Evaluation Scores

Scoring Range: 10 (Excellent) …5 (Neutral) ……. 0 (Poor)

	Industrial Park	Brunswick West	Brunswick East
Availability of Land	5	10	9
Topography	0	10	10
Hazardous Materials	10	7	8
Utility Connections	0	9	9
Residence Proximity	9	2	7
Land Use Compatible	8	8	5
Railroad Operations	7	10	3
Road Connections	5	9	9
Traffic Impacts	7	9	3
Cost	4	10	7
TOTAL	55	84	70

Applying weighting factors of 3 for HIGH, 2 for MEDIUM and 1 for LOW importance or relevance yields the following weighted scores:

Table 6: Weighted Evaluation Scores

	Weighting	Industrial Park	Brunswick West	Brunswick East
Availability of Land	Medium	10	20	18
Topography	High	0	30	30
Hazardous Materials	Medium	20	14	16
Utility Connections	Low	0	9	9
Residence Proximity	High	27	6	21
Land Use Compatible	High	24	24	15
Railroad Operations	High	21	30	9
Road Connections	Low	5	9	9
Traffic Impacts	Medium	14	18	6
Cost	High	12	30	21
TOTAL		133	190	154

8. Summary and Recommendation

Summary

Six (6) sites initially considered.
- Three (3) taken off the table
- Three (3) remaining sites were further evaluated.

The physical attributes of each site were evaluated and rated based on the following criteria:
- Availability of Land
- Topography
- Hazardous Materials
- Utility Connections
- Residence Proximity
- Land Use Compatibility
- Railroad Operations
- Road Connections
- Traffic Impacts

The Brunswick West site ranked highest and is being recommended for further development. The subject of visual impacts has been a concern at this site, particularly with views from the neighborhood into the layover facility site, and as a result has been investigated with a set of perspective renderings and an elevation comparing building heights and vegetative screening. Overall, it is recommended that consideration be given to reinforcing the existing tree and shrubbery screening between the Bouchard Street neighborhood and the railroad corridor. It is recommended that the design of such mitigating landscape features be a coordinated activity with the neighborhood.

The only external lighting at the facility will be for the roadway and parking areas. These will be mounted on poles or the side of the building at low heights (circa 20 feet). It is proposed to use Light Emitting Diode (LED) street fixtures, which will limit the illumination to the area requiring light, thereby minimizing spill light and sky glow. Shielding will also be integrated into the LED array to control any direct view from the neighborhood thus eliminating glare.

The renderings presented herein, as seen in Figures 7 through 11, depict a neutral external color for the layover facility building which is intended to diminish its visual impact. Selection of colors could be coordinated with representatives of the neighborhood as the design process moves forward.

The Report also includes an evaluation of the facility impacts in general, based on maximum proposed service levels.

Air Quality

- Evaluated pollutants associated with diesel locomotives
- Estimated maximum estimated concentrations of emissions associated with layover facility operations as they relate to cancer risk, chronic non-cancer hazard index, and the acute hazard index.
- Conclusion:
    - The potential air quality impacts associated with emissions of the toxic pollutants released from layover facility operations are not significant.

Noise & Vibration

- Evaluated noise and/or vibration associated with
    - Regular train operations including train movements and train horns at crossings.
    - The storage and maintenance of trains entering and idling in the layover facility including required horn blowing
    - Noise from mechanical and ventilation systems associated with the layover building
    - Employees and service vehicles associated with the layover building operations
- The generic noise analysis for operating trains indicated that:
    - Train noise associated with passing trains would not pose significant noise impact conditions in communities
    - Train horns operating at crossings would be considered unpleasantly loud within 400 feet of the train/crossing
    - The net noise associated with trains idling inside the layover building would be audible within 100 feet of the building, but unaudible at distances of 200 feet from the building.
    - Test horns blown within the building prior to the departure of each train set daily would be considered “noisy”, from a distance of 200 feet, but special noise features could be incorporated into the building design.
    - Ventilation systems associated with the layover building would be slightly more than quiet suburban nighttime, but could be mitigated by the type of fans and other mitigation measures.
    - Noises associated by the use of the facility, including vehicle access and parking would be unobtrusive or inaudible to the nearest noise-sensitive use in the vicinity of a layover building.
- Conclusion:
    - Neither the vibration associated with the movement of trains, nor the storage of trains in the layover facility would not impact receptors 100 feet or more from the track/facility.

In general, it was determined that the layover itself would not cause health risks or cause other severe impacts.

Recommendation:

As evidenced by the scoring process, none of the candidate sites can be considered to be a "perfect site" in terms of the evaluation factors. However, the Brunswick West site emerges as the highest ranking site considering all factors. Because of its historical use as a railroad property, proximity to the station, availability and relative cost effectiveness, it best accommodates the operational requirements of Downeaster service and the overall development plans of the Town of Brunswick. Although the other sites could ultimately be developed given sufficient additional financial resources, time, and changes in off-site and railroad operations, these issues do not appear to be resolvable in the near future.

The impact analysis conducted suggests that the operation of a layover facility would not cause health risks and would have only minimal impacts on the surrounding community. However, the presence of a neighborhood immediately south of the railroad corridor at the Brunswick West site raises particular concerns regarding the potential noise, air quality and visual impacts.

In an effort to help assess the impacts of the facility on that neighborhood, the Brunswick West site has been further investigated with a set of perspective renderings and elevations which assess the relative distances between the facility and the residences, the extent of vegetative screening, and a comparison of building height to its surroundings. As indicated in Figure 7, residents closest to the facility are located approximately 230 feet away, with 175 feet of vegetative screening in between. The air quality, noise and vibration analyses concluded that receptors 200 feet or more from the facility would not be significantly impacted. Additionally, mitigation actions which can be initiated as part of the development of this site can further reduce noise and visual impacts to neighbors without unduly impacting the overall cost and construction schedule of the project.

Related to visual impacts, the drawings (Figures 9, 10 and 11) indicate that the facility will be located below the existing tree line. A neutral external color, as depicted in the drawings, will further diminish its visual impact. It is recommended that consideration be given to reinforcing the existing tree and shrubbery screening between the Bouchard Street neighborhood and the railroad corridor. It is further recommended that selection of colors and the design of such mitigating landscape features be a coordinated activity with the neighborhood as the design process moves forward.

The only external lighting at the facility will be for the roadway and parking areas. These will be mounted on poles or the side of the building at low heights (circa 20 feet). It is proposed to use Light Emitting Diode (LED) street fixtures, which will limit the illumination to the area requiring light, thereby minimizing sill light and sky glow. Shielding will also be integrated into the LED array to control any direct view from the neighborhood thus eliminating glare.

An additional consideration would be for the Town of Brunswick to pursue Quiet Zone designations for the Stanwood Street and Union Street crossings to minimize the impact of train horns passing through neighborhoods for regular service, or layover movements.

Based on the foregoing analysis, it is recommended that the development of the Downeaster Layover Facility proceed at the Brunswick West site. If approved by the NNEPRA Board of Directors, the next step would be to develop site-specific ambient measurements and models to

objectively and quantifiably conclude if project-related air quality, noise and/or vibration levels pose a concern to the community. If they do, mitigating measures which can be incorporated into the project would be identified. Concurrently, site specific engineering, design and costs will be developed in a timeline to facilitate construction beginning in Spring 2012.

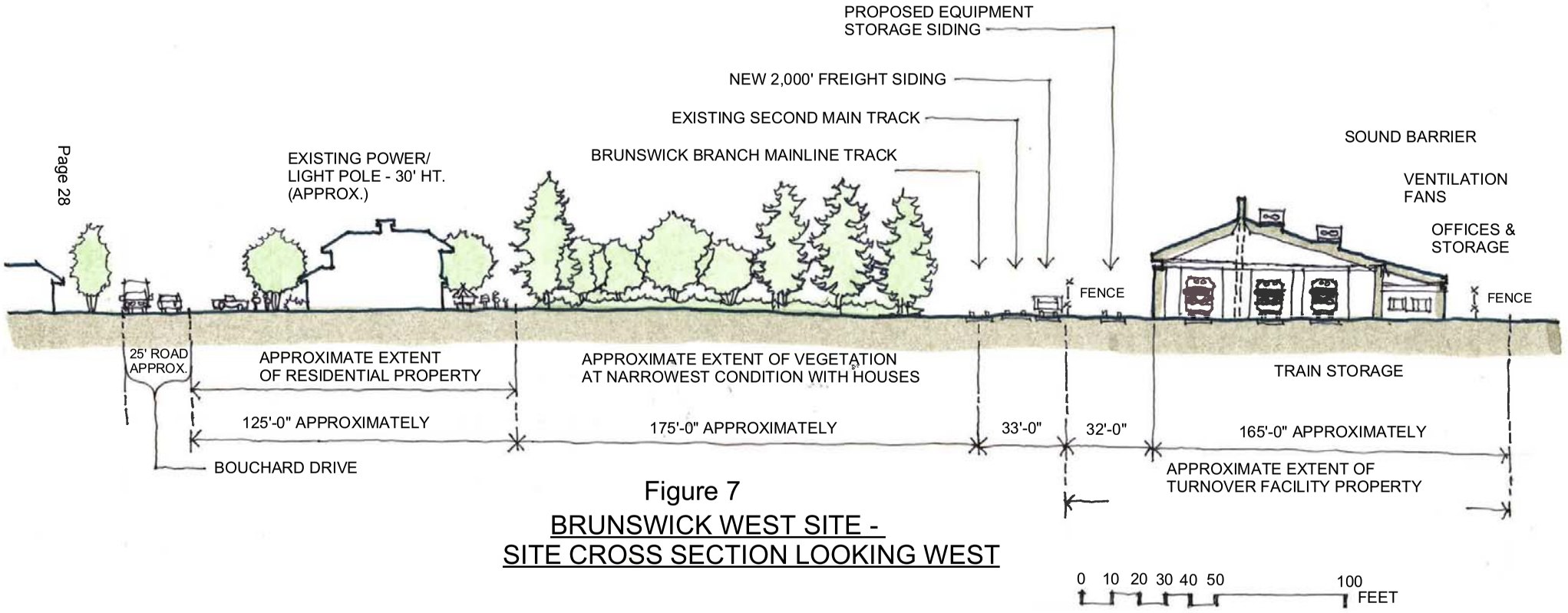


Figure 7

BRUNSWICK WEST SITE -
SITE CROSS SECTION LOOKING WEST

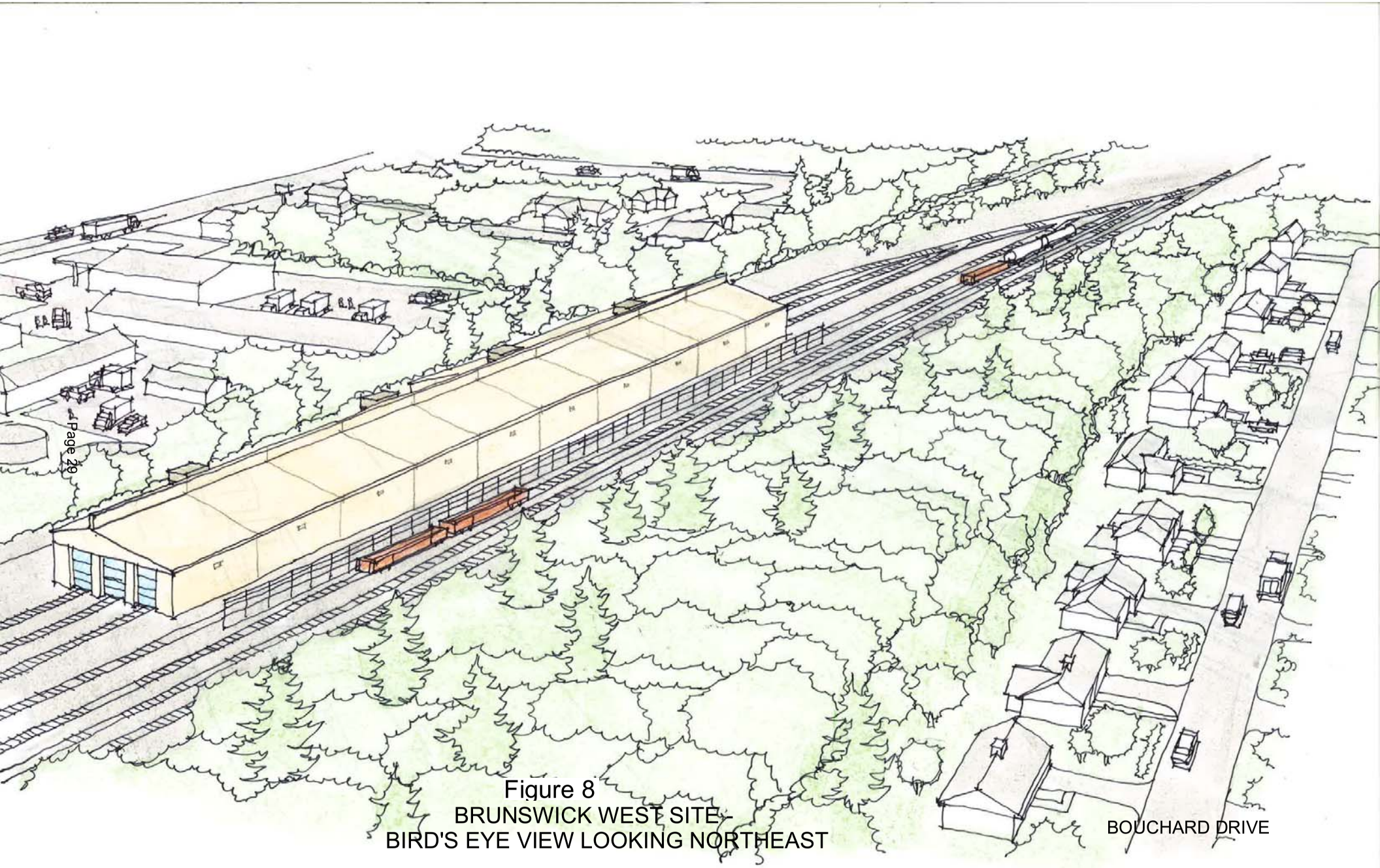


Figure 8
BRUNSWICK WEST SITE -
BIRD'S EYE VIEW LOOKING NORTHEAST

Figure 9

BRUNSWICK WEST SITE

BOUCHARD DRIVE (CENTRAL) LOOKING NORTH - "SUMMER" VERSION

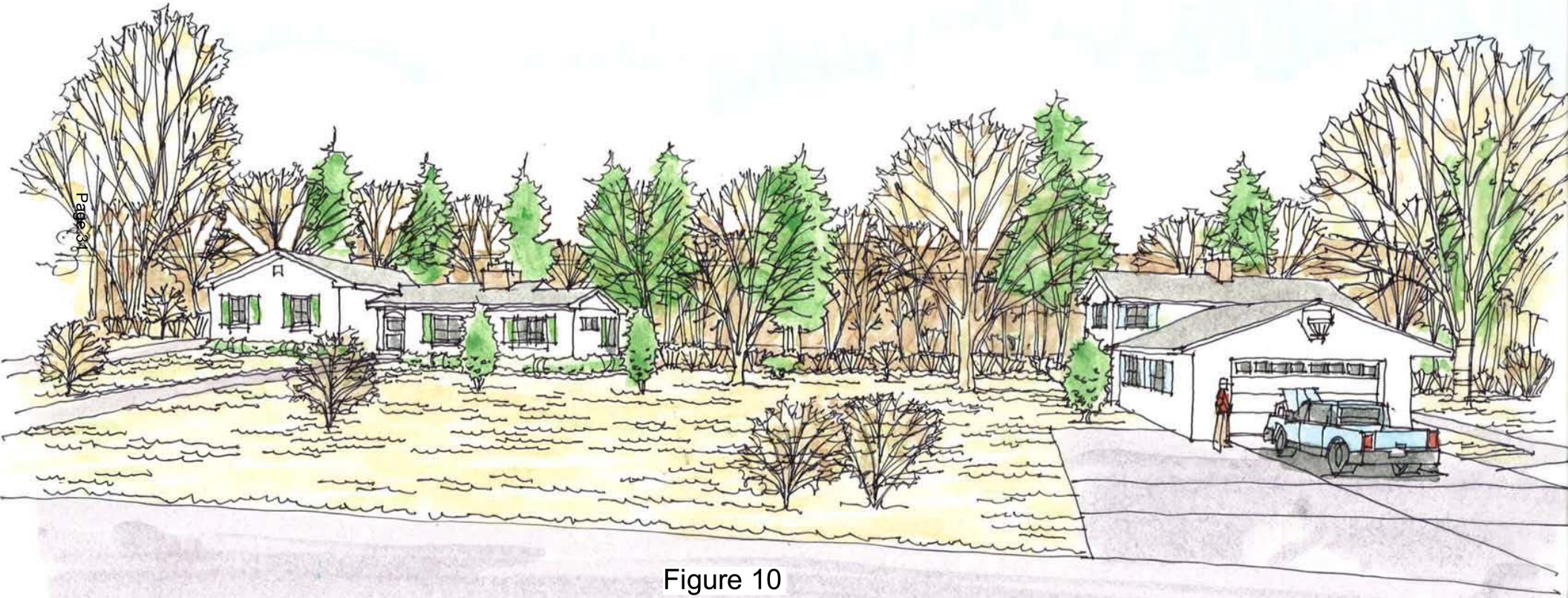
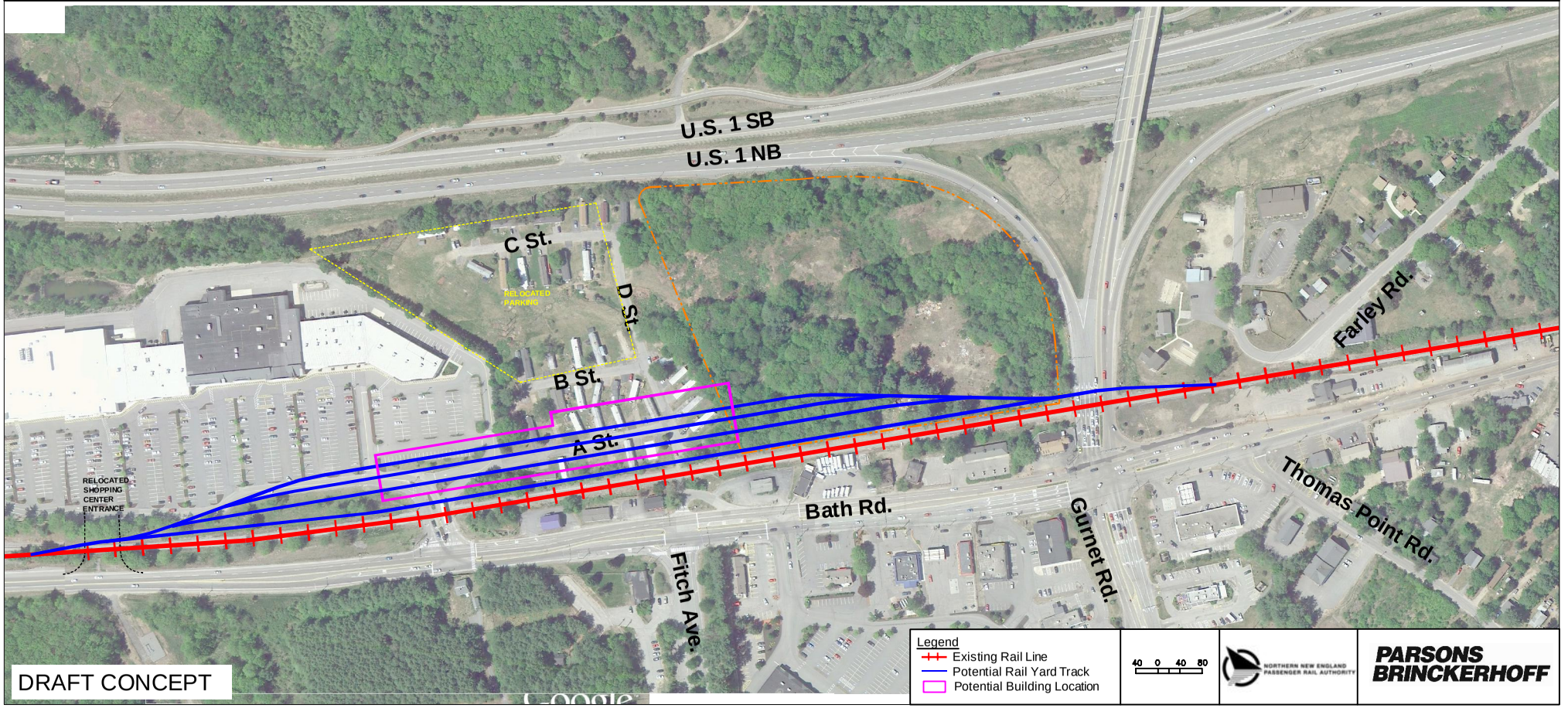


Figure 10
BRUNSWICK WEST SITE
BOUCHARD DRIVE (CENTRAL) LOOKING NORTH - "WINTER" VERSION

Figure 11
BRUNSWICK WEST SITE
VIEW LOOKING SOUTHEAST FROM PLEASANT STREET

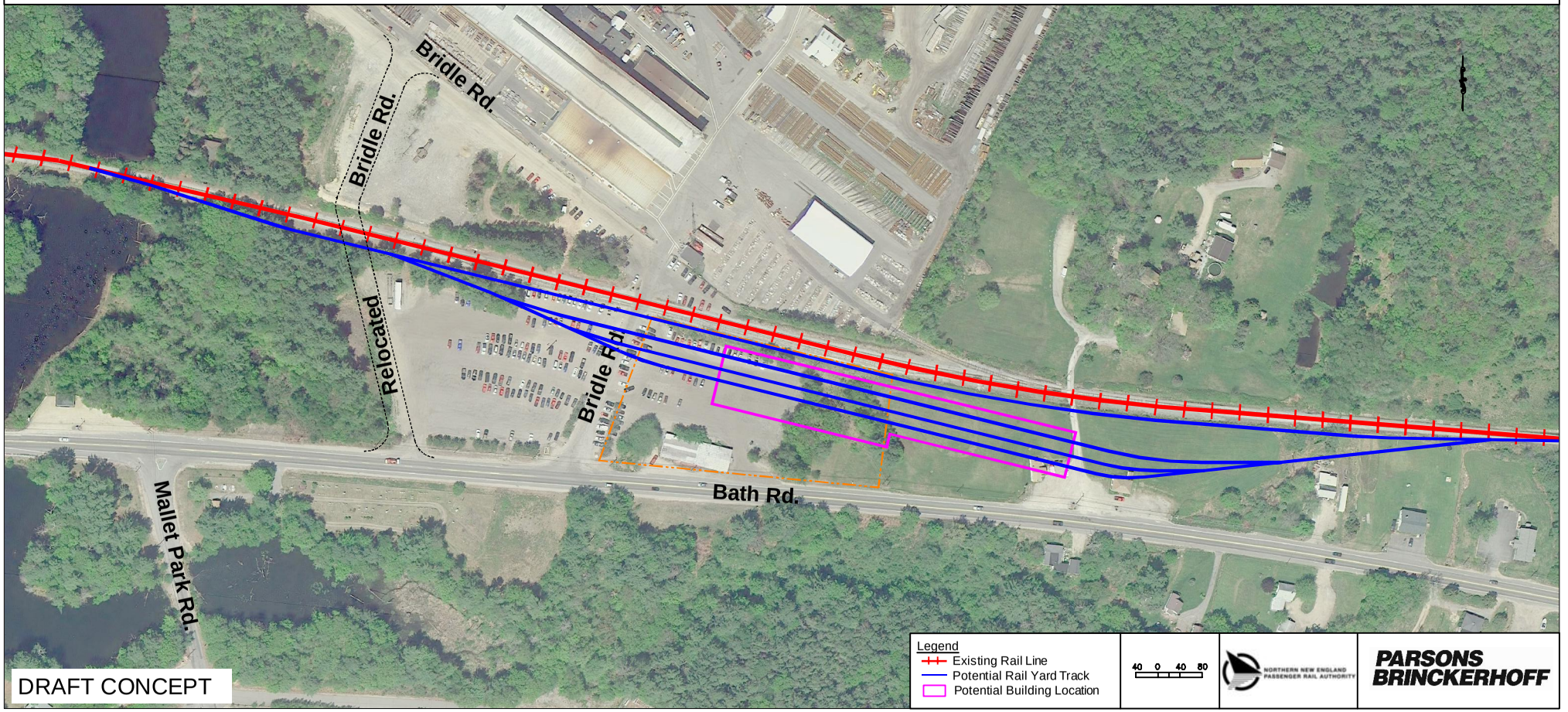
APPENDIX A

DOWNEASTER BRUNSWICK STORAGE AND MAINTENANCE FACILITY
BEHIND 175 BATH ROAD SITE



DOWNEASTER BRUNSWICK STORAGE AND MAINTENANCE FACILITY

393 BATH ROAD SITE



DOWNEASTER BRUNSWICK STORAGE AND MAINTENANCE FACILITY

NAVAL AIR STATION SITE