Expanded Environmental Notification Form

Request for Phase I WAIVER

Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

MassDOT Highway Division
City of Beverly

May 31, 2013

Commonwealth of Massachusetts

Executive Office of Energy and Environmental Affairs
Massachusetts Environmental Policy Act (MEPA) Office

Environmental Notification Form

For Office Use Only

EEA#: _____

MEPA Analyst: _____

The information requested on this form must be completed in order to submit a document electronically for review under the Massachusetts Environmental Policy Act, 301 CMR 11.00.

Project Name: Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project		
Street Address: Brimbal Avenue/Sohier Road/Dunham Road/Exit 19, Route 128		
Municipality: Beverly	Watershed: North Coastal and Ipswich River	
Universal Transverse Mercator Coordinates: 42.57518ºN; 70.87921º W	Latitude: 42º 34' 30.79" N Longitude: 70º 52' 45.1" W	
Estimated commencement date: Phase 1: Fall 2013 Phase 2 (Full Build): 2014	Estimated completion date: Phase 1: Fall 2014 Phase 2 (Full Build): 2016	
Project Type: Transportation	Status of project design: Phase 1: 25% complete Phase 2: Conceptual design	
Proponent: MassDOT Highway Division and City of Beverly		
Street Address: 10 Park Plaza		
Municipality: Boston	State: MA	Zip Code: 02116
Name of Contact Person: Grace Arthur		
Firm/Agency: MassDOT	Street Address: 10 Park Plaza, Room 4260	
Municipality: Boston	State: MA	Zip Code: 02116
Phone:857-368-8787	Fax: 857-368-0609	E-mail: Grace.Arthur@state.ma.us

Does this project meet or exceed a mandatory EIR threshold (see 301 CMR 11.03)?
☒Yes ☐No
11.03(6)(a) 2.-new interchange on a completed limited access highway.
If this is an Expanded Environmental Notification Form (ENF) (see 301 CMR 11.05(7)) or a Notice of Project Change (NPC), are you requesting:

a Single EIR? (see 301 CMR 11.06(8)) ☐Yes ☒No
a Special Review Procedure? (see 301CMR 11.09) ☐Yes ☒No
a Waiver of mandatory EIR? (see 301 CMR 11.11) ☐Yes ☒No
a Phase I Waiver? (see 301 CMR 11.11) ☒Yes ☐No
(Note: Greenhouse Gas Emissions analysis must be included in the Expanded ENF.)

Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?
11.03(1)(b)1.-alteration of 25 or more acres of land, and 11.03(1)(b)2.-creation of five or more acres of impervious area. (Phase 2 Full Build)
11.03(6)(a)2.-new interchange on a completed limited access highway. (Phase 2 Full Build)
11.03(6)1.b.-widening 4 feet or more for a distance of 1/2 mile or more. (Phase 1 and Phase 2)
Which State Agency Permits will the project require?
Phase 1 of the project will be built by the City of Beverly and will require a highway access permit. Phase 2 will

be a state highway project. The City of Beverly will request a Determination of Applicability under the Wetland Protection Act (WPA) and the Beverly Wetland Ordinance for Phase 1. MassDOT will request an Order of Conditions under WPA for Phase 2 (Full Build).

Identify any financial assistance or land transfer from an Agency of the Commonwealth, including the Agency name and the amount of funding or land area in acres:

The City of Beverly submitted an application to the MassWorks Infrastructure Program for both design ($500,000) and construction ($5 million) of Phase 1. DIF (District Improvement Financing), MassWorks Grant, and Local Infrastructure Financing would be used for Phase 2 (Full Build).

Land takings-The Phase 1 improvements will require a two-step acquisition process. The state will convey surplus land to a private developer and the developer shall convey land required to build the relocated connector road to the state.

Summary of Project Size & Environmental Impacts	**Existing**	**Change**	**Total**
LAND			
Total site acreage Phase 1 and Phase 2 (Full Build)	**34**		
New acres of land altered		**Phase 1: 6** **Phase 2: 23**	
Acres of impervious area	**Phase 1: 14** **Phase 2: 20** **(assumes Phase 1 completion)**	**Phase 1: 6** **Phase 2: 22**	**Phase 1: 20** **Phase 2: 42**
Square feet of new bordering vegetated wetlands alteration		**Phase 1: 0** **Phase 2: Estimate of 2,000 SF BVW**	
Square feet of new other wetland alteration: Isolated Vegetated Wetland (IVW)		**Phase 1: 0** **Phase 2: Estimate of 35,000 SF IVW**	
Acres of new non-water dependent use of tidelands or waterways		**NA**	
STRUCTURES			
Gross square footage	**NA**	**NA**	**NA**
Number of housing units	**NA**	**NA**	**NA**
Maximum height (feet)	**NA**	**NA**	**NA**
TRANSPORTATION			
1. Brimbal Avenue	15,090 ADT	0 ADT	15,090 ADT
2. Sohier Road	8,850	0	8,850
3. Otis Road	100	0	100
4. Tozer Road	5,930	0	5,930
5. Connector Road	9,420	0	9,420
Estimated average daily traffic (ADT) from potential development has been included in Greenhouse Gas Analysis in Section 2.5.3 of Project Narrative.			
Parking spaces	**NA**	**NA**	**NA**
WASTEWATER			

Water Use (Gallons per day)	NA	NA	NA
Water withdrawal (GPD)	NA	NA	NA
Wastewater generation/treatment (GPD)	NA	NA	NA
Length of water mains (miles)	NA	NA	NA
Length of sewer mains (miles)	NA	NA	NA
Has this project been filed with MEPA before? ☒ Yes (EEA # **13331**) ☐No			
Has any project on this site been filed with MEPA before? ☐ Yes (EEA #_____) ☒No			

GENERAL PROJECT INFORMATION – all proponents must fill out this section

PROJECT DESCRIPTION:
Describe the existing conditions and land uses on the project site:

The Route 128, Exit 19 at Brimbal Avenue Interchange Improvements project is centered around Exit 19 on Route 128 in Beverly and includes Brimbal Avenue, Sohier Road, Otis Road, and Dunham Road. The land surrounding the existing interchange east of Route 128 is primarily industrial. Much of the project area west of Route 128 is residential. The North Shore Music Theatre is a major land use west of Route 128 and just beyond the project area is Norwood Pond. East of Route 128 is industrial with pockets of residential and institutional (Beverly Hospital and Beverly High School).

Brimbal Avenue is an arterial roadway that intersects Dunham Road and the Route 128 southbound and northbound ramps in the vicinity of Route 128. Sohier Road is an urban minor arterial running north/south that connects Route 128 with downtown Beverly. Connector Road is an east/west connector about 500 feet long that connects Sohier Road and Brimbal Avenue and completes the interchange. Dunham Road is north of and parallel to Route 128 and intersects Brimbal Avenue. Otis Road is a dead-end local roadway that at one time provided access to the Beverly Sanitary Landfill. The landfill is no longer used and has been capped. Currently, Otis Road is being used as an access to contractor office space and other commercial uses that are on parcels adjacent to the landfill parcel. The proposed Phase 2 (Full Build) would generally follow the Otis Road alignment.

Describe the proposed project and its programmatic and physical elements:

NOTE: The project description should summarize both the project's direct and indirect impacts (including construction period impacts) in terms of their magnitude, geographic extent, duration and frequency, and reversibility, as applicable. It should also discuss the infrastructure requirements of the project and the capacity of the municipal and/or regional infrastructure to sustain these requirements into the future.

The Route 128, Exit 19 at Brimbal Avenue Interchange Improvements project (Project) would modify the existing Brimbal Avenue/Sohier Road Interchange (Exit 19) with Route 128 in Beverly and construct an expanded interchange as part of Exit 19. The Interchange Improvements Project is part of an overall strategy of transportation and other infrastructure improvements to provide for improved safety and congestion mitigation on the North Shore and along Route 128.

The Project will improve safety and operations on Route 128 at Interchange 19 and facilitate the expansion of the economic base of the area by improving transportation access to potential development and re-development parcels. The Metropolitan Area Planning Council considers this a Regionally Significant Transportation Investment.

The Project would be completed in two phases. The limits of Phase 1 and Phase 2 (Full Build Project) areas are shown in Figures 1-1, 1-2 and 1-3. The City of Beverly submitted an application to the MassWorks Infrastructure Program for both design ($500,000) and construction ($5 million) of Phase 1. The Phase 1 waiver is being requested so that available funds can be used for start of construction of the first phase in the winter of 2013 as required by the MassWorks grant program and to address the safety and access issues that are independent of the full build project.

Phase 1 includes roadway and intersection improvements to Brimbal Avenue, Sohier Road, and the Connector Road as discussed in detail in Section 2 of the attached Project Narrative and shown on the attached project plans. The Connector Road intersections will be either signalized or constructed with roundabouts as discussed in Section 2. The project plans illustrate the signal option; however, a preferred option has not yet been determined. The Connector Road would be relocated as part of Phase 1 which will improve safety by creating longer storage lanes for vehicles coming off Route 128 northbound and by signalizing critical left turn movements at each end of the Connector Road. This would alleviate congestion and reduce vehicular crashes. Relocation of the Connector Road would provide access to an undeveloped parcel hindered by the existing Connector Road. Construction of Phase 1 of the project will allow development to occur on land between Brimbal Avenue and Sohier Road and will improve access to other nearby institutions, businesses, and residential properties.

The unsignalized intersection of Herrick Street Extension and Brimbal Avenue currently operates at Level of Service E (up to 37 seconds delay) with long queues on Herrick Street at the peak hour. The lack of gaps in the traffic flow for vehicles turning left from Herrick Street onto Brimbal Avenue adds to driver frustration and the potential for angle collisions. The intersection would be signalized and re-striped to create additional turn lanes as part of Phase 1.

The Phase 2 (Full Build Project) will:

- Alleviate backups and substandard geometrics on Route 128;
- Alleviate congestion at Exit 19, Brimbal Avenue and adjacent roads within the project area;
- Facilitate development and redevelopment within a priority development area.

Three concepts have been evaluated for Phase 2 (Full Build Project) as discussed in Section 3. The preferred concept (Concept 3) is to construct an expanded interchange by building an additional bridge over Route 128 with new on and off ramps, and removing several substandard ramps from the existing interchange. Three options under Concept 3 have been developed but a specific preferred alternative has not been selected. The Phase 2 (Full Build Project) includes the existing interchange ramp system, Route 128, Brimbal Avenue, Sohier Road, Dunham Road, and Otis Road. Herrick Street Extension will be widened at the intersection with Brimbal Avenue, and the Tozer/Sohier Road intersection will be signalized and widened for turn lanes (for Phase 2).

Describe the on-site project alternatives (and alternative off-site locations, if applicable), considered by the proponent, including at least one feasible alternative that is allowed under current zoning, and the reasons(s) that they were not selected as the preferred alternative:

NOTE: The purpose of the alternatives analysis is to consider what effect changing the parameters and/or siting of a project, or components thereof, will have on the environment, keeping in mind that the objective of the MEPA review process is to avoid or minimize damage to the environment to the greatest extent feasible. Examples of alternative projects include alternative site locations, alternative site uses, and alternative site configurations.

Alternatives for Phase 1 were evaluated as discussed in Section 2.4 of the Project Narrative. These alternatives included reconstructing the Connector Road in the same location, and relocating the Connector Road with either roundabouts or signals. Three alternative concepts have been evaluated in Section 3 of the Project Narrative for Phase 2 (Full Build Project) :

Concept 1 Reconstruct the Existing Interchange

Concept 2 Reconstruct the Existing Interchange with a New Overpass

Concept 3 Expand the Interchange

- Option A Expand the Interchange with a Single Point Urban Interchange
- Option B Expand the Interchange with a Diamond Interchange with Signals
- Option C Expand the Interchange with a Diamond Interchange with Roundabouts
- Option D Expand the Interchange with a Modified Diamond Interchange

Summarize the mitigation measures proposed to offset the impacts of the preferred alternative:

Phase 1:

Traffic Measures: The unsignalized intersection of Herrick Street Extension and Brimbal Avenue currently operates at Level of Service E (up to 37 seconds delay) with long queues on Herrick Street at the peak hour. The lack of gaps in the traffic flow for vehicles turning left from Herrick Street onto Brimbal Avenue adds to driver frustration and the potential for angle collisions. The intersection would be signalized and lane striping would be done within the existing road cross section as part of Phase 1.

Environmental Measures: Erosion controls will be implemented to protect wetland resources. All unpaved Buffer Zone areas will be stabilized and seeded. No traffic noise impacts are predicted for Phase 1. Noise mitigation during construction will be implemented as needed. Stormwater management will be in compliance with DEP regulations and will improve water quality of roadway stormwater discharge. Solid waste and hazardous materials management plans will be developed as needed and in accordance with applicable requirements.

Phase 2 (Full Build Project):

Traffic Measures: Herrick Street Extension will be widened at the intersection with Brimbal Avenue, and the Tozer/Sohier Road intersection will be signalized and widened for turn lanes.

Environmental Measures: Erosion controls will be implemented to protect wetland resources. All unpaved Buffer Zone areas will be stabilized and seeded. Stormwater management will be in compliance with DEP regulations and will improve water quality of roadway stormwater discharge. Impacts to wetlands will be minimized and wetland replication would be provided. Noise abatement will be implemented if needed. Noise mitigation during construction will be implemented as needed. Solid waste and hazardous materials management plans will be developed as needed and in accordance with applicable requirements.

If the project is proposed to be constructed in phases, please describe each phase:

The Project will be completed in two phases. **Phase 1** includes roadway and intersection improvements to Brimbal Avenue, Sohier Road, and the relocation of the Connector Road. The intersection of Herrick Street Extension with Brimbal Avenue will be signalized and lane striping for left turns will be added to the Route 128 southbound off ramp to Brimbal Avenue.

The preferred concept (Concept 3) for **Phase 2 (Full Build Project)** is to construct an expanded interchange by building an additional bridge over Route 128 with new on and off ramps, replacing the Brimbal Avenue Bridge, and removing three substandard ramps from the existing interchange.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN:

Is the project within or adjacent to an Area of Critical Environmental Concern?

☐ Yes (Specify_____)

☒ No

if yes, does the ACEC have an approved Resource Management Plan? ___ Yes ___ No;

If yes, describe how the project complies with this plan.
_____

Will there be stormwater runoff or discharge to the designated ACEC? ___ Yes **NA** No;
If yes, describe and assess the potential impacts of such stormwater runoff/discharge to the designated ACEC.

RARE SPECIES:
Does the project site include Estimated and/or Priority Habitat of State-Listed Rare Species? (see http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/priority_habitat/priority_habitat_home.htm)
☐Yes (Specify_____) ☒No

HISTORICAL /ARCHAEOLOGICAL RESOURCES:
Does the project site include any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth?
☐Yes (Specify_____) ☒No

St. Mary's Cemetery on the south side of Brimbal Avenue has been identified by the City of Beverly Historic District Commission as a documented property with potential for impacts. The project will not impact this parcel.

If yes, does the project involve any demolition or destruction of any listed or inventoried historic or archaeological resources? ☐Yes (Specify_____) ☐No

WATER RESOURCES:
Is there an Outstanding Resource Water (ORW) on or within a half-mile radius of the project site? **X** Yes ___No;
if yes, identify the ORW and its location. **Phase 1 project area: Potential Vernal Pool 2586. Phase 2 (Full Build) Project Area: Certified Vernal Pool (No.3617) and Potential Vernal Pool 2584, Dunham Road Drive**

(NOTE: Outstanding Resource Waters include Class A public water supplies, their tributaries, and bordering wetlands; active and inactive reservoirs approved by MassDEP; certain waters within Areas of Critical Environmental Concern, and certified vernal pools. Outstanding resource waters are listed in the Surface Water Quality Standards, 314 CMR 4.00.)

Are there any impaired water bodies on or within a half-mile radius of the project site? __Yes **X**_ No; if yes, identify the water body and pollutant(s) causing the impairment:

Is the project within a medium or high stress basin, as established by the Massachusetts Water Resources Commission? ___Yes **X** No

STORMWATER MANAGEMENT:

Generally describe the project's stormwater impacts and measures that the project will take to comply with the standards found in MassDEP's Stormwater Management Regulations:

Within the Phase 1 project limits, stormwater is currently untreated prior to discharge. The project proposes to collect the stormwater in new deep sump catch basins and direct the stormwater into a detention-recharge basin prior to discharge to the existing outfall. Stormwater treatment will also be provided in a vegetated bio-swale with stone sediment traps. For the Phase 2 (Full Build) project, existing catch basins will be replaced with deep sump catch basins and interceptor swales will improve stormwater quality prior to discharge. Both phases of the project will be designed in compliance with the DEP stormwater regulations.

MASSACHUSETTS CONTINGENCY PLAN:
Has the project site been, or is it currently being, regulated under M.G.L.c.21E or the Massachusetts Contingency Plan? Yes ___No **X** ; if yes, please describe the current status of the site (including Release Tracking Number (RTN), cleanup phase, and Response
Action Outcome classification): _____

Is there an Activity and Use Limitation (AUL) on any portion of the project site? Yes ___ No **X**; **There is an AUL (gas station) on Brimbal Avenue, outside of the limit of work for the project.**
if yes, describe which portion of the site and how the project will be consistent with the AUL:

Are you aware of any Reportable Conditions at the property that have not yet been assigned an RTN?
Yes ___ No **X** ; if yes, please describe:_____

SOLID AND HAZARDOUS WASTE:

If the project will generate solid waste during demolition or construction, describe alternatives considered for re-use, recycling, and disposal of, e.g., asphalt, brick, concrete, gypsum, metal, wood:

A waste management plan will be developed that will require separation of demolition waste and a hierarchy of recycling and reuse for metal, asphalt, brick and concrete in accordance with applicable requirements of 310 CMR 16 and 310 CMR 19.

(NOTE: Asphalt pavement, brick, concrete and metal are banned from disposal at Massachusetts landfills and waste combustion facilities and wood is banned from disposal at Massachusetts landfills. See 310 CMR 19.017 for the complete list of banned materials.)

Will your project disturb asbestos containing materials? Yes___ No **X**_ Phase 1 does not involve demolition.
if yes, please consult state asbestos requirements at http://mass.gov/MassDEP/air/asbhom01.htm

Describe anti-idling and other measures to limit emissions from construction equipment:

The Project will establish an internal (within project limits) traffic control plan to enhance worker safety and minimize unnecessary diesel engine idling. This plan will be monitored for effectiveness and upgraded as necessary to optimize performance.

DESIGNATED WILD AND SCENIC RIVER:

Is this project site located wholly or partially within a defined river corridor of a federally designated Wild and Scenic River or a state designated Scenic River? Yes ___ No **X** ;
if yes, specify name of river and designation:

If yes, does the project have the potential to impact any of the "outstandingly remarkable" resources of a federally Wild and Scenic River or the stated purpose of a state designated Scenic River?
Yes ___ No ___ ; if yes, specify name of river and designation: _____;
if yes, will the project will result in any impacts to any of the designated "outstandingly remarkable" resources of the Wild and Scenic River or the stated purposes of a Scenic River.
Yes ___ No ___ ;
if yes,describe the potential impacts to one or more of the "outstandingly remarkable" resources or stated purposes and mitigation measures proposed.

ATTACHMENTS:

1. List of all attachments to this document.
2. U.S.G.S. map (good quality color copy, 8-½ x 11 inches or larger, at a scale of 1:24,000) indicating the project location and boundaries.
3.. Plan, at an appropriate scale, of existing conditions on the project site and its immediate environs, showing all known structures, roadways and parking lots, railroad rights-of-way, wetlands and water bodies, wooded areas, farmland, steep slopes, public open spaces, and major utilities.
4 Plan, at an appropriate scale, depicting environmental constraints on or adjacent to the project site such as Priority and/or Estimated Habitat of state-listed rare species, Areas of Critical Environmental Concern, Chapter 91 jurisdictional areas, Article 97 lands, wetland resource area delineations, water supply protection areas, and historic resources

and/or districts.

5. Plan, at an appropriate scale, of proposed conditions upon completion of project (if construction of the project is proposed to be phased, there should be a site plan showing conditions upon the completion of each phase).
6. List of all agencies and persons to whom the proponent circulated the ENF, in accordance with 301 CMR 11.16(2).
7. List of municipal and federal permits and reviews required by the project, as applicable.

LIST OF EENF ATTACHMENTS

- Project Narrative
- Traffic Summary, Jacobs, May 2013
- Correspondence with Massachusetts Historical Commission, September 10, 2012
- Phase 1 Greenhouse Gas Emissions Worksheets Memo, May 2013
- Phase 1 Project Plans, May 2013
- Distribution List

LAND SECTION – all proponents must fill out this section

I. Thresholds / Permits

A. Does the project meet or exceed any review thresholds related to **land** (see 301 CMR 11.03(1) **X** Yes ___ No; if yes, specify each threshold: 11.03(1)(b)1.-alteration of 25 or more acres of land, and 11.03(1)(b)2.-creation of five or more acres of impervious area. (Phase 2 Full Build)

II. Impacts and Permits

A. Describe, in acres, the current and proposed character of the project site, as follows:

	Existing	Change	Total
Footprint of buildings	**NA**	**NA**	**NA**
Internal roadways	**NA**	**NA**	**NA**
Parking and other paved areas			
Paved Roadways:			
Phase 1:	**14**	**6**	**20**
Phase 2:	**20**	**22**	**42**
	(assumes Phase 1 completion)		
Other altered areas	**NA**	**NA**	**NA**
Undeveloped areas	**NA**	**NA**	**NA**

B. Has any part of the project site been in active agricultural use in the last five years? ___ Yes **X** No; if yes, how many acres of land in agricultural use (with prime state or locally important agricultural soils) will be converted to nonagricultural use?

C. Is any part of the project site currently or proposed to be in active forestry use? ___ Yes **X** No; if yes, please describe current and proposed forestry activities and indicate whether any part of the site is the subject of a forest management plan approved by the Department of Conservation and Recreation:

D. Does any part of the project involve conversion of land held for natural resources purposes in accordance with Article 97 of the Amendments to the Constitution of the Commonwealth to any purpose not in accordance with Article 97? ___ Yes **X** No; if yes, describe:

E. Is any part of the project site currently subject to a conservation restriction, preservation restriction, agricultural preservation restriction or watershed preservation restriction? ___ Yes **X** No; if yes, does the project involve the release or modification of such restriction? ___ Yes ___ No; if yes, describe:

F. Does the project require approval of a new urban redevelopment project or a fundamental change in an existing urban redevelopment project under M.G.L.c.121A? ___ Yes **X** No; if yes, describe:

G. Does the project require approval of a new urban renewal plan or a major modification of an existing urban renewal plan under M.G.L.c.121B? Yes ___ No **X**; if yes, describe:

III. Consistency

A. Identify the current municipal comprehensive land use plan
Title: **The City of Beverly Master Plan** Date **2002**

B. The City of Beverly Master Plan established broad goals and specific actions. Both the Transportation and Economic Development goals and objectives support promoting development in existing development locations. The Open Space goals call for controlling the amount and rate of the loss of open space to development of all types. The proposed

project is consistent with the Master Plan by improving infrastructure and access to un- and underdeveloped development parcels and underutilized facilities. Existing zoning and existing land uses adjacent to Exit 19 are primarily industrial, warehousing, and commercial. The southern end of the project area and adjacent districts have a mix of land uses including residential, multi-family residential, and hospital uses, and the project would not be incompatible with these adjacent land uses.

Specifically, Master Plan lays out a broad goal of "reversing the trend of declining commercial and industrial property values goals for economic development." It discusses the goal "focus the development and redevelopment of commercial and industrial projects in appropriate locations," and the Route 128 corridor was identified as a location to develop land currently zoned for industry rather than rezoning new areas.

The Master Plan identifies approximately 120 acres of IR ("restricted industrial, research, and office district") zoned land around the proposed interchange that are important for commercial expansion. This project supports development at this location. These 120 acres of undeveloped or underdeveloped land are surrounded by 460 more acres of undeveloped and underdeveloped residential and tax-exempt land. Proximity to regional highways, commuter rail, and a labor force make this area attractive for new development. The Master Plan states that the "real potential of the industrial land in the north central region is contingent on the construction of the new Route 128 overpass." The Master Plan also identified the need to improve highway safety and congestion at Exit 19.

As part of Master Plan implementation, the City established the IR Overlay District which adds flexibility to the IR district, specifically by allowing mixed-use commercial development. This rezoning to prepare for additional commercial development was done in anticipation of access and circulation improvements at Brimbal Avenue.

Finally, the 2008 Beverly Open Space and Recreation Plan (OSRP) identifies Norwood Pond, a freshwater pond project outside the project area to the north, as having natural habitats for aquatic pond life, vernal pool creatures, birds, other fauna and flora. The 88-acre forest around Norwood Pond supports the largest number of vernal pools in the City. City-owned land to the west of Norwood Pond is zoned Open Space & Recreation. The OSRP states that "construction of an overpass/interchange on Route 128 will have to be carefully evaluated to insure that they do not degrade the pond and its surrounding open space."

C. Identify the current Regional Policy Plan of the applicable Regional Planning Agency (RPA)
RPA: **MAPC**

Title: **North Shore Regional Strategic Planning Project** Date **2011**

D. Describe the project's consistency with that plan with regard to:
1) economic development
2) adequacy of infrastructure
3) open space impacts
4) compatibility with adjacent land uses

The North Shore Regional Strategic Planning Project, sponsored by Metropolitan Area Planning Council (MAPC) and the Executive Office of Housing and Economic Development, is an initiative that promotes sustainable economic development and smart growth consistent with MAPC's MetroFuture 2030 regional plan. The North Shore Regional Strategic Planning

Project involved six municipalities in MAPC's North Shore Task Force subregion, Beverly, Danvers, Hamilton, Ipswich, Salem, and Wenham. The primary goal of the planning project was to update the region's priority development and preservation areas in accordance with MetroFuture. Another key goal of the project was to "identify regional transportation improvements that would enable future development within and around these municipalities in accordance with these objectives."

A priority development area (PDA) is an area identified by the City and MAPC as "capable of supporting additional development or as candidates for redevelopment, but that may first require additional investments in infrastructure." Three PDAs in Beverly in the Exit 19 area were identified by the City and MAPC:

- Sohier and Tozer Road
- Brimbal Avenue
- Dunham Road

These three PDAs were deemed regionally significant for having characteristics including transit access, existing population and employment density, sewer, and being located in an area of mixed uses and goods and services. The proposed project supports plans for new development in these PDAs.

A priority preservation area (PPA) is an area identified by the City and MAPC that merits special protection because of the presence of significant environmental factors and natural features. One PPA in Beverly in the Exit 19 area was identified by the City and MAPC, Norwood Pond. The proposed project supports preservation at Norwood Pond.

The proposed project is consistent with the North Shore Regional Strategic Planning Project's Regionally Significant Transportation Investments, projects and activities that would support the PDAs identified for development. The project is listed as a Regionally Significant Transportation Investment because it would increase efficiency and enhance interconnectivity for major roadways that serve regional travel needs.

RARE SPECIES SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **rare species or habitat** (see 301 CMR 11.03(2))? ___ Yes **X** No; if yes, specify, in quantitative terms:

(NOTE: If you are uncertain, it is recommended that you consult with the Natural Heritage and Endangered Species Program (NHESP) prior to submitting the ENF.)

B. Does the project require any state permits related to **rare species or habitat**? ___ Yes **X** No

C. Does the project site fall within mapped rare species habitat (Priority or Estimated Habitat?) in the current Massachusetts Natural Heritage Atlas (attach relevant page)? ___ Yes **X** No.

D. If you answered "No" to all questions A, B and C, proceed to the **Wetlands, Waterways, and Tidelands Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Rare Species section below.

II. Impacts and Permits

A. Does the project site fall within Priority or Estimated Habitat in the current Massachusetts Natural Heritage Atlas (attach relevant page)? ___ Yes **X** No. If yes,

1. Have you consulted with the Division of Fisheries and Wildlife Natural Heritage and Endangered Species Program (NHESP)? ___Yes **X** No; if yes, have you received a determination as to whether the project will result in the "take" of a rare species? ___ Yes ___ No; if yes, attach the letter of determination to this submission.

2. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes **X** No; if yes, provide a summary of proposed measures to minimize and mitigate rare species impacts

3. Which rare species are known to occur within the Priority or Estimated Habitat? **NA**

4. Has the site been surveyed for rare species in accordance with the Massachusetts Endangered Species Act? ___ Yes **NA** No

4. If your project is within Estimated Habitat, have you filed a Notice of Intent or received an Order of Conditions for this project? ___ Yes **NA** No; if yes, did you send a copy of the Notice of Intent to the Natural Heritage and Endangered Species Program, in accordance with the Wetlands Protection Act regulations? ___ Yes ___ No

B. Will the project "take" an endangered, threatened, and/or species of special concern in accordance with M.G.L. c.131A (see also 321 CMR 10.04)? ___ Yes **NA** No; if yes, provide a summary of proposed measures to minimize and mitigate impacts to significant habitat:

WETLANDS, WATERWAYS, AND TIDELANDS SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wetlands, waterways, and tidelands** (see 301 CMR 11.03(3))? ___ Yes **X** No; if yes, specify, in quantitative terms:

B. Does the project require any state permits (or a local Order of Conditions) related to **wetlands, waterways, or tidelands**? **X** Yes ___ No; if yes, specify which permit: **A Request for Determination of Applicability (RDA) will be submitted to the Beverly Conservation Commission for Phase 1 work within the Buffer Zone. An Order of Conditions will be required for Phase 2 (Full Build).**

C. If you answered "No" to both questions A and B, proceed to the **Water Supply Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wetlands, Waterways, and Tidelands Section below.

II. Wetlands Impacts and Permits

A. Does the project require a new or amended Order of Conditions under the Wetlands Protection Act (M.G.L. c.131A)? **Phase 2 (Full Build)** Yes ___ No; if yes, has a Notice of Intent been filed? ___ Yes **X** No; if yes, list the date and MassDEP file number: _____; if yes, has a local Order of Conditions been issued? ___ Yes ___ No; Was the Order of Conditions appealed? ___ Yes ___ No. Will the project require a Variance from the Wetlands regulations? ___ Yes **X** No.

B. Describe any proposed permanent or temporary impacts to wetland resource areas located on the project site:

Phase 1 of the project does not result in any permanent or temporary impacts to wetland resource areas. The Phase 1 project will impact 1,530 SF of Buffer Zone of a Bordering Vegetated Wetland (BVW). The existing Buffer Zone consists of roadway and parking lot pavements and grass slopes. No alteration to the existing Buffer Zone characteristics is anticipated. A Request for Determination of Applicability (RDA) will be submitted to the Beverly Conservation Commission for Phase 1 work within the Buffer Zone.

Phase 2 (Full Build) will result in permanent impacts to wetland resources. It is estimated that approximately 2,000 SF of BVW and 35,000 SF of Isolated Wetland would be altered, depending on the selected preferred alternative which will be identified in the draft EIR.

C. Estimate the extent and type of impact that the project will have on wetland resources, and indicate whether the impacts are temporary or permanent:

Coastal Wetlands	Area (square feet) or Length (linear feet)	Temporary or Permanent Impact?
Land Under the Ocean	**NA**	
Designated Port Areas	**NA**	
Coastal Beaches	**NA**	
Coastal Dunes	**NA**	
Barrier Beaches	**NA**	
Coastal Banks	**NA**	
Rocky Intertidal Shores	**NA**	
Salt Marshes	**NA**	
Land Under Salt Ponds	**NA**	
Land Containing Shellfish	**NA**	
Fish Runs	**NA**	
Land Subject to Coastal Storm Flowage	**NA**	

Inland Wetlands

Bank (lf)	**Phase 2 (Full Build): Estimate of 10 LF**	**_Permanent_**
Bordering Vegetated Wetlands	**Phase 2 (Full Build): Estimate of 2,000 SF**	**___Permanent_____**
Isolated Vegetated Wetlands	**Phase 2 (Full Build): Estimate of 35,000 SF**	**___Permanent_____**
Land under Water	**_____NA** _____	_____
Isolated Land Subject to Flooding	**_____NA** _____	_____
Bordering Land Subject to Flooding	**_____NA** _____	_____
Riverfront Area	**_____NA**_____	_____

D. Is any part of the project:

1. proposed as a **limited project**? ___Yes **X** No; if yes, what is the area (in sf)?
2. the construction or alteration of a **dam**? ___ Yes **X** No; if yes, describe:
3. fill or structure in a **velocity zone** or **regulatory floodway**? ___ Yes **X** No
4. dredging or disposal of dredged material? ___ Yes **X** No; if yes, describe the volume of dredged material and the proposed disposal site:
5. a discharge to an **Outstanding Resource Water (ORW)** or an **Area of Critical Environmental Concern (ACEC)**? ___ Yes **X** No
   Stormwater will not be discharged to the potential vernal pool.
6. subject to a wetlands restriction order? ___ Yes **X** No; if yes, identify the area (in sf):
7. located in buffer zones? **X** Yes ___No; if yes, how much (in sf) **_1,530**

E. Will the project:

1. be subject to a local wetlands ordinance or bylaw? **X** Yes ___ No
2. alter any federally-protected wetlands not regulated under state law? **X** Yes __No; if yes, what is the area (sf)? **Phase 2 (Full Build): Estimate of 35,000 SF**

III. Waterways and Tidelands Impacts and Permits

A. Does the project site contain waterways or tidelands (including filled former tidelands) that are subject to the Waterways Act, M.G.L.c.91? ___ Yes **X** No; if yes, is there a current Chapter 91 License or Permit affecting the project site? ___ Yes ___ No; if yes, list the date and license or permit number and provide a copy of the historic map used to determine extent of filled tidelands:

B. Does the project require a new or modified license or permit under M.G.L.c.91? ___ Yes **X** No; if yes, how many acres of the project site subject to M.G.L.c.91 will be for non-water-dependent use? Current ___ Change ___ Total ___
If yes, how many square feet of solid fill or pile-supported structures (in sf)?

C. For non-water-dependent use projects, indicate the following:
Area of filled tidelands on the site:_____
Area of filled tidelands covered by buildings:_____
For portions of site on filled tidelands, list ground floor uses and area of each use:
_____
Does the project include new non-water-dependent uses located over flowed tidelands?
Yes ___ No ___
Height of building on filled tidelands_____
Also show the following on a site plan: Mean High Water, Mean Low Water, Water-dependent Use Zone, location of uses within buildings on tidelands, and interior and exterior areas and facilities dedicated for public use, and historic high and historic low water marks.

D. Is the project located on landlocked tidelands? ___ Yes **X** No; if yes, describe the project's impact on the public's right to access, use and enjoy jurisdictional tidelands and describe

measures the project will implement to avoid, minimize or mitigate any adverse impact:

E. Is the project located in an area where low groundwater levels have been identified by a municipality or by a state or federal agency as a threat to building foundations? ___Yes **X** No; if yes, describe the project's impact on groundwater levels and describe measures the project will implement to avoid, minimize or mitigate any adverse impact:

F. Is the project non-water-dependent **and** located on landlocked tidelands **or** waterways or tidelands subject to the Waterways Act **and** subject to a mandatory EIR? ___ Yes **X** No;
(NOTE: If yes, then the project will be subject to Public Benefit Review and Determination.)

G. Does the project include dredging? ___ Yes **X** No; if yes, answer the following questions:
What type of dredging? Improvement ___ Maintenance ___ Both ____
What is the proposed dredge volume, in cubic yards (cys) _____
What is the proposed dredge footprint ____length (ft) ___width (ft)____depth (ft);
Will dredging impact the following resource areas?
Intertidal Yes__ No__; if yes, ___ sq ft
Outstanding Resource Waters Yes__ No__; if yes, ___ sq ft
Other resource area (i.e. shellfish beds, eel grass beds) Yes__ No__; if yes __ sq ft
If yes to any of the above, have you evaluated appropriate and practicable steps to: 1) avoidance; 2) if avoidance is not possible, minimization; 3) if either avoidance or minimize is not possible, mitigation?
If no to any of the above, what information or documentation was used to support this determination?
Provide a comprehensive analysis of practicable alternatives for improvement dredging in accordance with 314 CMR 9.07(1)(b). Physical and chemical data of the sediment shall be included in the comprehensive analysis.
Sediment Characterization
Existing gradation analysis results? __Yes ___No: if yes, provide results.
Existing chemical results for parameters listed in 314 CMR 9.07(2)(b)6? ___Yes ____No; if yes, provide results.
Do you have sufficient information to evaluate feasibility of the following management options for dredged sediment? If yes, check the appropriate option.
Beach Nourishment ___
Unconfined Ocean Disposal ___
Confined Disposal:
Confined Aquatic Disposal (CAD) ___
Confined Disposal Facility (CDF) ___
Landfill Reuse in accordance with COMM-97-001 ___
Shoreline Placement ___
Upland Material Reuse____
In-State landfill disposal____
Out-of-state landfill disposal ____
(NOTE: This information is required for a 401 Water Quality Certification.)

IV. Consistency:

A. Does the project have effects on the coastal resources or uses, and/or is the project located within the Coastal Zone? ___ Yes **X** No; if yes, describe these effects and the projects consistency with the policies of the Office of Coastal Zone Management:

B. Is the project located within an area subject to a Municipal Harbor Plan? ___ Yes **X** No; if yes, identify the Municipal Harbor Plan and describe the project's consistency with that plan:

WATER SUPPLY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **water supply** (see 301 CMR 11.03(4))? ___ Yes **X** No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **water supply**? ___ Yes **X** No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Wastewater Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Water Supply Section below.

II. Impacts and Permits

A. Describe, in gallons per day (gpd), the volume and source of water use for existing and proposed activities at the project site:

	Existing	Change	Total
Municipal or regional water supply	_____	_____	_____
Withdrawal from groundwater	_____	_____	_____
Withdrawal from surface water	_____	_____	_____
Interbasin transfer	_____	_____	_____

(NOTE: Interbasin Transfer approval will be required if the basin and community where the proposed water supply source is located is different from the basin and community where the wastewater from the source will be discharged.)

B. If the source is a municipal or regional supply, has the municipality or region indicated that there is adequate capacity in the system to accommodate the project? ___ Yes ___ No

C. If the project involves a new or expanded withdrawal from a groundwater or surface water source, has a pumping test been conducted? ___ Yes ___ No; if yes, attach a map of the drilling sites and a summary of the alternatives considered and the results. _____

D. What is the currently permitted withdrawal at the proposed water supply source (in gallons per day)? _____Will the project require an increase in that withdrawal? ___Yes ___No; if yes, then how much of an increase (gpd)? _____

E. Does the project site currently contain a water supply well, a drinking water treatment facility, water main, or other water supply facility, or will the project involve construction of a new facility? ___ Yes ___No. If yes, describe existing and proposed water supply facilities at the project site:

	Permitted Flow	Existing Avg Daily Flow	Project Flow	Total
Capacity of water supply well(s) (gpd)	_____	_____	_____	_____
Capacity of water treatment plant (gpd)	_____	_____	_____	_____

F. If the project involves a new interbasin transfer of water, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or proposed?

G. Does the project involve:

1. new water service by the Massachusetts Water Resources Authority or other agency of the Commonwealth to a municipality or water district? ___ Yes ___ No
2. a Watershed Protection Act variance? ___ Yes ___ No; if yes, how many acres of alteration?
3. a non-bridged stream crossing 1,000 or less feet upstream of a public surface drinking water supply for purpose of forest harvesting activities? ___ Yes ___ No

III. Consistency

Describe the project's consistency with water conservation plans or other plans to enhance water resources, quality, facilities and services:

WASTEWATER SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **wastewater** (see 301 CMR 11.03(5))? ___ Yes **X** No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **wastewater**? ___ Yes **X** No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Transportation -- Traffic Generation Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Wastewater Section below.

II. Impacts and Permits

A. Describe the volume (in gallons per day) and type of disposal of wastewater generation for existing and proposed activities at the project site (calculate according to 310 CMR 15.00 for septic systems or 314 CMR 7.00 for sewer systems):

	Existing	Change	Total
Discharge of sanitary wastewater	_____	_____	_____
Discharge of industrial wastewater	_____	_____	_____
TOTAL	_____	_____	_____

	Existing	Change	Total
Discharge to groundwater	_____	_____	_____
Discharge to outstanding resource water	_____	_____	_____
Discharge to surface water	_____	_____	_____
Discharge to municipal or regional wastewater facility	_____	_____	_____
TOTAL	_____	_____	_____

B. Is the existing collection system at or near its capacity? ___ Yes ___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

C. Is the existing wastewater disposal facility at or near its permitted capacity? ___ Yes___ No; if yes, then describe the measures to be undertaken to accommodate the project's wastewater flows:

D. Does the project site currently contain a wastewater treatment facility, sewer main, or other wastewater disposal facility, or will the project involve construction of a new facility? ___ Yes ___ No; if yes, describe as follows:

	Permitted	Existing Avg Daily Flow	Project Flow	Total
Wastewater treatment plant capacity (in gallons per day)	_____	_____	_____	_____

E. If the project requires an interbasin transfer of wastewater, which basins are involved, what is the direction of the transfer, and is the interbasin transfer existing or new?

(NOTE: Interbasin Transfer approval may be needed if the basin and community where wastewater will be discharged is different from the basin and community where the source of water supply is located.)

F. Does the project involve new sewer service by the Massachusetts Water Resources Authority (MWRA) or other Agency of the Commonwealth to a municipality or sewer district? ___ Yes ___ No

G. Is there an existing facility, or is a new facility proposed at the project site for the storage, treatment, processing, combustion or disposal of sewage sludge, sludge ash, grit, screenings, wastewater reuse (gray water) or other sewage residual materials? ___ Yes ___ No; if yes, what is the capacity (tons per day):

	Existing	Change	Total
Storage	_____	_____	_____
Treatment	_____	_____	_____
Processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

H. Describe the water conservation measures to be undertaken by the project, and other wastewater mitigation, such as infiltration and inflow removal.

III. Consistency

A. Describe measures that the proponent will take to comply with applicable state, regional, and local plans and policies related to wastewater management:

B. If the project requires a sewer extension permit, is that extension included in a comprehensive wastewater management plan? ___ Yes ___ No; if yes, indicate the EEA number for the plan and whether the project site is within a sewer service area recommended or approved in that plan:

TRANSPORTATION SECTION (TRAFFIC GENERATION)

I. Thresholds / Permit

A. Will the project meet or exceed any review thresholds related to **traffic generation** (see 301 CMR 11.03(6))? ___ Yes **X** No; if yes, specify, in quantitative terms:

The project is a transportation project that will not in and of itself generate traffic beyond normal background growth. The project has, however, been designed to accommodate future traffic from anticipated development.

B. Does the project require any state permits related to **state-controlled roadways**? **X** Yes ___ No; if yes, specify which permit:

Phase 1 of the project will be built by the City of Beverly and will require a highway access permit. Phase 2 will be a state highway project.

C. If you answered "No" to both questions A and B, proceed to the **Roadways and Other Transportation Facilities Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Traffic Generation Section below.

II. Traffic Impacts and Permits

A. Describe existing and proposed vehicular traffic generated by activities at the project site:

	Existing	Change	Total
Number of parking spaces	**NA**	**NA**	**NA**
Number of vehicle trips per day	**NA**	**NA**	**NA**
ITE Land Use Code(s):	**NA**	**NA**	**NA**

B. What is the estimated average daily traffic on roadways serving the site?

Roadway	Existing	Change	Total
1. Brimbal Avenue	15,090	0	15,090
2. Sohier Road	8,850	0	8,850
3. Otis Road	100	0	100
4. Tozer Road	5,930	0	5,930
5. Connector Road	9,420	0	9,420
Estimated vehicle trips from potential development have been included in Greenhouse Gas Analysis in Section 2.5.3 of Project Narrative.			

C. If applicable, describe proposed mitigation measures on state-controlled roadways that the project proponent will implement:

Signalization of intersection of Herrick Street Extension / Brimbal Avenue and lane striping at intersection of Rte. 128 southbound off ramp and Brimbal Ave for Phase 1. The Phase 2 (Full build) project will include a signal at the intersection of Tozer Road and Sohier Road.

D. How will the project implement and/or promote the use of transit, pedestrian and bicycle facilities and services to provide access to and from the project site?

Congestion on Brimbal Avenue and Sohier Road will be relieved with the proposed project. Bike lanes will be installed on Brimbal Avenue and Sohier Road within the project area. Sidewalks in

the project area will be widened and improved wherever possible within the Phase 1 project area, and new sidewalks will be provided on the relocated Connector Road. Sidewalks will be included along all new proposed roadways in Phase 2 (Full Build).

C. Is there a Transportation Management Association (TMA) that provides transportation demand management (TDM) services in the area of the project site? _X_ Yes ____ No; if yes, describe if and how will the project will participate in the TMA:

North Shore Transportation Management Association serves Beverly and adjacent cities and towns. One project-area business is currently a member of the TMA.

The City of Beverly is an ex officio member of the North Shore TMA board and helps direct policy for the TMA. It is anticipated that the City will become a dues-paying member of the TMA. The City is starting to develop incentives and requirements that will promote business participation in the TMA. The City is committed to establishing requirements for new development to participate in the TMA at an appropriate level.

D. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation facilities? ____ Yes **X** No; if yes, generally describe:

E. If the project will penetrate approach airspace of a nearby airport, has the proponent filed a Massachusetts Aeronautics Commission Airspace Review Form (780 CMR 111.7) and a Notice of Proposed Construction or Alteration with the Federal Aviation Administration (FAA) (CFR Title 14 Part 77.13, forms 7460-1 and 7460-2)?

The project is not within the approach airspace of the Beverly Municipal Airport or any other airport.

III. Consistency

Describe measures that the proponent will take to comply with municipal, regional, state, and federal plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services:

This infrastructure project is a Complete Streets project, balancing the needs of automobiles, trucks, pedestrians, transit and cyclists. In addition to addressing geometric and safety deficiencies on Route 128 and the ramps, the project will improve conditions on local streets. The project will improve and add sidewalks and pedestrian signals and add bike lanes. Potential future bus service on Brimbal Avenue would experience less congestion and delay. Buses could pull over and not block traffic.

TRANSPORTATION SECTION (ROADWAYS AND OTHER TRANSPORTATION FACILITIES)

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **roadways or other transportation facilities** (see 301 CMR 11.03(6))? **X** Yes ___ No; if yes, specify, in quantitative terms:

Phase 1: 11.03(6)(b)1.b.-widening 4ft or more for a distance of 0.53 miles;
Phase 2: 11.03(6)(a)2.-new interchange on a completed limited access highway.

B. Does the project require any state permits related to **roadways or other transportation facilities**? **X** Yes ___ No; if yes, specify which permit:

Phase 1 of the project will be built by the City of Beverly and will require a highway access permit. Phase 2 will be a state highway project.

C. If you answered "No" to both questions A and B, proceed to the **Energy Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Roadways Section below.

II. Transportation Facility Impacts

A. Describe existing and proposed transportation facilities in the immediate vicinity of the project site:

B. Will the project involve any

1. Alteration of bank or terrain (in linear feet)? __**None**____
2. Cutting of living public shade trees (number)? __**None**_____
3. Elimination of stone wall (in linear feet)? __**None**____

III. Consistency -- Describe the project's consistency with other federal, state, regional, and local plans and policies related to traffic, transit, pedestrian and bicycle transportation facilities and services, including consistency with the applicable regional transportation plan and the Transportation Improvements Plan (TIP), the State Bicycle Plan, and the State Pedestrian Plan:

This infrastructure project is a Complete Streets project, balancing the needs of automobiles, trucks, pedestrians, transit and cyclists. In addition to addressing geometric and safety deficiencies on Route 128 and the ramps, the project will improve conditions on local streets. The project will improve and add sidewalks and pedestrian signals; add bike lanes; and will make it slightly easier to run bus service as Brimbal Avenue will be widened allowing a bus to pull over and not block traffic.

ENERGY SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **energy** (see 301 CMR 11.03(7))? ___ Yes **X** No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **energy**? ___ Yes **X** No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Air Quality Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Energy Section below.

II. Impacts and Permits

A. Describe existing and proposed energy generation and transmission facilities at the project site:

	Existing	Change	Total
Capacity of electric generating facility (megawatts)	_____	_____	_____
Length of fuel line (in miles)	_____	_____	_____
Length of transmission lines (in miles)	_____	_____	_____
Capacity of transmission lines (in kilovolts)	_____	_____	_____

B. If the project involves construction or expansion of an electric generating facility, what are:

1. the facility's current and proposed fuel source(s)?
2. the facility's current and proposed cooling source(s)?

C. If the project involves construction of an electrical transmission line, will it be located on a new, unused, or abandoned right of way? ___Yes ___No; if yes, please describe:

D. Describe the project's other impacts on energy facilities and services:

III. Consistency

Describe the project's consistency with state, municipal, regional, and federal plans and policies for enhancing energy facilities and services:

AIR QUALITY SECTION

I. Thresholds

A. Will the project meet or exceed any review thresholds related to **air quality** (see 301 CMR 11.03(8))? ___ Yes **X** No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **air quality**? ___ Yes **X** No; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Solid and Hazardous Waste Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Air Quality Section below.

II. Impacts and Permits

A. Does the project involve construction or modification of a major stationary source (see 310 CMR 7.00, Appendix A)? ___ Yes ___ No; if yes, describe existing and proposed emissions (in tons per day) of:

	Existing	Change	Total
Particulate matter	_____	_____	_____
Carbon monoxide	_____	_____	_____
Sulfur dioxide	_____	_____	_____
Volatile organic compounds	_____	_____	_____
Oxides of nitrogen	_____	_____	_____
Lead	_____	_____	_____
Any hazardous air pollutant	_____	_____	_____
Carbon dioxide	_____	_____	_____

B. Describe the project's other impacts on air resources and air quality, including noise impacts:

III. Consistency

A. Describe the project's consistency with the State Implementation Plan:

B. Describe measures that the proponent will take to comply with other federal, state, regional, and local plans and policies related to air resources and air quality:

SOLID AND HAZARDOUS WASTE SECTION

I. Thresholds / Permits

A. Will the project meet or exceed any review thresholds related to **solid or hazardous waste** (see 301 CMR 11.03(9))? ___ Yes **X** No; if yes, specify, in quantitative terms:

B. Does the project require any state permits related to **solid and hazardous waste**? ___ Yes **X** **No** ; if yes, specify which permit:

C. If you answered "No" to both questions A and B, proceed to the **Historical and Archaeological Resources Section**. If you answered "Yes" to either question A or question B, fill out the remainder of the Solid and Hazardous Waste Section below.

II. Impacts and Permits

A. Is there any current or proposed facility at the project site for the storage, treatment, processing, combustion or disposal of solid waste? ___ Yes ___ No; if yes, what is the volume (in tons per day) of the capacity:

	Existing	Change	Total
Storage	_____	_____	_____
Treatment, processing	_____	_____	_____
Combustion	_____	_____	_____
Disposal	_____	_____	_____

B. Is there any current or proposed facility at the project site for the storage, recycling, treatment or disposal of hazardous waste? ___ Yes ___ No; if yes, what is the volume (in tons or gallons per day) of the capacity:

	Existing	Change	Total
Storage	_____	_____	_____
Recycling	_____	_____	_____
Treatment	_____	_____	_____
Disposal	_____	_____	_____

C. If the project will generate solid waste (for example, during demolition or construction), describe alternatives considered for re-use, recycling, and disposal:

D. If the project involves demolition, do any buildings to be demolished contain asbestos?
___ Yes ___ No

E. Describe the project's other solid and hazardous waste impacts (including indirect impacts):

III. Consistency

Describe measures that the proponent will take to comply with the State Solid Waste Master Plan:

HISTORICAL AND ARCHAEOLOGICAL RESOURCES SECTION

I. Thresholds / Impacts

A. Have you consulted with the Massachusetts Historical Commission? **X (for Phase 1)** Yes ___ No; if yes, attach correspondence. For project sites involving lands under water, have you consulted with the Massachusetts Board of Underwater Archaeological Resources? ____Yes **NA** No; if yes, attach correspondence. **See Attachment 3.**

B. Is any part of the project site a historic structure, or a structure within a historic district, in either case listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? ___ Yes **X** No; if yes, does the project involve the demolition of all or any exterior part of such historic structure? ___ Yes ___ No; if yes, please describe:

C. Is any part of the project site an archaeological site listed in the State Register of Historic Places or the Inventory of Historic and Archaeological Assets of the Commonwealth? ___ Yes **X** No; if yes, does the project involve the destruction of all or any part of such archaeological site? ___ Yes ___ No; if yes, please describe:

D. If you answered "No" to all parts of both questions A, B and C, proceed to the **Attachments and Certifications** Sections. If you answered "Yes" to any part of either question A or question B, fill out the remainder of the Historical and Archaeological Resources Section below.

II. Impacts

Describe and assess the project's impacts, direct and indirect, on listed or inventoried historical and archaeological resources:

None. Saint Mary's Cemetery on the south side of Brimbal Avenue has been identified by the City of Beverly Historic District Commission as a documented property with potential for impacts. The project will not impact this parcel.

III. Consistency

Describe measures that the proponent will take to comply with federal, state, regional, and local plans and policies related to preserving historical and archaeological resources:

Does not apply

CERTIFICATIONS:

1. The Public Notice of Environmental Review has been/will be published in the following newspapers in accordance with 301 CMR 11.15(1):

Boston Globe	**Date:**	6/12/2013
Salem Evening News	**Date:**	6/12/2013

2. This form has been circulated to Agencies and Persons in accordance with 301 CMR 11.16(2).

Signatures:

6/6/2013 _____

Date **Frank DePaola, P.E., Administrator, Highway Division**
Massachusetts Department of Transportation

30 May 2013 _____

Date **William F. Scanlon, Jr., Mayor**
City of Beverly

6/6/13 _____

Date Signature of Responsible Officer or Proponent

Kevin M. Walsh
Name (print or type)
MassDOT Highway Division
Firm/Agency
10 Park Plaza Room 4260,
Street
Boston, MA 02116
Municipality/State/Zip
857-368-8830
Phone

5/30/13 _____

Date Signature of person preparing ENF (if different from above)

Maryann T. Magner
Name (print or type)
Jacobs Engineering
Firm/Agency
343 Congress Street
Street
Boston, MA 02210
Municipality/State/Zip
617-242-9222
Phone

Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project Beverly, Massachusetts

Expanded Environmental Notification Form

Request for Phase 1 Waiver

Project Narrative

May 31, 2013

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1. INTRODUCTION

1.1 Project Summary

The Route 128 Exit 19 Interchange Improvements Project would modify the existing Brimbal Avenue/Sohier Road Interchange (Exit 19) with Route 128 in Beverly and construct an expanded interchange as part of Exit 19. The Interchange Improvements Project is part of an overall strategy of transportation and other infrastructure improvements to provide for improved safety and congestion mitigation on the North Shore and along Route 128.

The Exit 19 Interchange Improvements Project will improve safety and operations on Route 128 at Interchange 19 and facilitate the expansion of the economic base of the area by improving transportation access to potential development and re-development parcels. The Metropolitan Area Planning Council considers this a Regionally Significant Transportation Investment.

The Phase 2 (Full Build) project will:

- Alleviate backups and substandard geometrics on Route 128;
- Alleviate congestion at Exit 19, Brimbal Avenue and on adjacent roads within the project area;
- Facilitate development and redevelopment within a priority development area.

The Project would be completed in two phases. The Phase 1 and Phase 2 (Full Build) project areas are shown in Figures 1-1, 1-2 and 1-3. The City of Beverly submitted a successful application to the MassWorks Infrastructure Program for both design ($500,000) and construction ($5 million) of Phase 1. The Phase 1 waiver is being requested so that available funds can be used for construction of the first phase of the project this year as required by the MassWorks grant program and to address the safety and access issues that are independent of the full build project.

Phase 1 includes roadway and intersection improvements to Brimbal Avenue, Sohier Road, and the Connector Road as discussed in detail in Section 2 and shown on the attached Project Plans. The Connector Road would be relocated as part of Phase 1 which will improve safety by creating longer storage lanes for vehicles coming off Route 128 northbound and by providing enhanced traffic control (signals or roundabouts) for critical left turn movements at each end of the Connector Road. The project plans illustrate the signal option; however, a preferred option has not yet been determined. Relocation of the Connector Road would provide access to an undeveloped parcel hindered by the existing Connector Road. Construction of Phase 1 of the project will allow development to occur on land between Brimbal Avenue and Sohier Road and will facilitate planned expansions of nearby businesses. The project will improve access to institutions, businesses, and

residential properties in the area. The Connector Road intersections will be either signalized or constructed with roundabouts as discussed in Section 2.

The unsignalized intersection of Herrick Street Extension and Brimbal Avenue currently operates at Level of Service E (up to 37 seconds delay) with long queues on Herrick Street at the peak hour. The lack of gaps in the traffic flow for vehicles turning left from Herrick Street onto Brimbal Avenue adds to driver frustration and the potential for angle collisions. The intersection would be signalized and lane striping would be done within the existing road cross section as part of Phase 1.

To address the objectives of the project, three concepts have been evaluated for the **Phase 2 (Full Build)** phase of the project as discussed in Section 3. The preferred concept (Concept 3) is to construct an expanded interchange by building an additional bridge over Route 128 with new on and off ramps, and removing several substandard ramps from the existing interchange. Three options under Concept 3 have been developed but a specific preferred alternative has not been selected. The Phase 2 (Full Build) project area includes the existing interchange ramp system, Route 128, Brimbal Avenue, Sohier Road, Dunham Road, and Otis Road. Herrick Street Extension will be widened at the intersection with Brimbal Avenue, and the Tozer/Sohier Road intersection will be signalized and widened for turn lanes.

1.2 Background and Project History

Route 128 History

The concept of a circumferential road around Boston was first planned in the 1900s. Initially, during the 1920s and early 1930s, the Route 128 designation was assigned to local roads. Construction of a new controlled-access freeway began in the 1930s under Mass DPW Commissioner William F. Callahan and was the first limited-access circumferential highway to be constructed in the United States. Progress on the new roadway slowed with a change in administration and WWII. After the war, construction resumed on the Yankee Division Highway, named for the 26th Infantry Division. In the 1950s construction of the road was extended north from Danvers to Gloucester. The alignment of Route 128 through undeveloped areas away from town centers at first gave it the nickname the “highway to nowhere” but this would later give way to the unofficial title of America’s Technology Highway. By the end of the 1950s sections of the road were already congested and capacity improvements were being planned. Safety and capacity improvements for the roadway and interchanges have been ongoing ever since.

Route 128 has experienced official changes in identity over the years. As sections of the roadway were upgraded and incorporated into the interstate highway system, the designations at times changed to or included I-95, I-93, and US 1 in addition to MA 128. In some sections there were periods of times when drivers were on a roadway with all four designations at once.

Today, starting at the northern terminus, the circumferential highway around Boston is designated as the following:

- MA Route 128 between Gloucester and Peabody
- Interstate 95 / MA 128 between Peabody and Canton
- Interstate 93 / MA 128 between Canton and Braintree

Exit 19 Interchange Improvements Project History

In 2003, the Central Transportation Planning Staff (CTPS), the Boston Metropolitan Planning Organization's technical transportation planning staff, completed a feasibility study of safety and operational improvements at 11 interchanges along Route 128 in Beverly, Wenham, Manchester-by-the-Sea, and Gloucester (*Route 128 Study*, CTPS, June 2003). The study identified locations with safety/operational concerns, evaluated existing geometry against current standards, projected 2025 traffic conditions, and recommended improvements.

At Exit 19, the CTPS study found

> *"this partial cloverleaf interchange carries much more traffic than most of the other interchanges in the study area. The highway capacity analyses indicate that many locations, including ramp junctions and ramp termini, will operate at undesirable levels of service in the future. The Registry of Motor Vehicles crash data show a relatively high number of crashes during the period 1996 to 2000."*

The CTPS study also noted that deceleration and acceleration lengths were insufficient to maintain safe traffic operations, and the ramps have tight turning curves which impact vehicle maneuvers.

The City of Beverly undertook a design and feasibility study for the interchange in 2004 (*Conceptual Design and Feasibility Study*, Edwards and Kelcey, June 2004). That feasibility study identified deficiencies at the interchange and developed several alternatives to address safety, operational, and access issues.

An Environmental Notification Form (ENF) was filed with MEPA in 2004. The project required the preparation of an Environmental Impact Report (EIR) and was issued a Scope by MEPA on September 10, 2004 (EEA Number 13331). The project did not go forward and an EIR was not submitted.

The City of Beverly has pursued funding for the project, including building it in phases and using innovative financing methods. The newly created MassWorks program consolidated six existing infrastructure programs for municipalities seeking public infrastructure funding. The City was awarded a $500,000 MassWorks grant in 2012 for design of the first phase of the project. The total construction cost for Phase 1 is approximately $5,000,000. The City is contemplating creating a DIF (District Improvement Financing) and earmarking a portion of taxes generated by Phase 1 development for construction of Phase 2 (Full Build).

An Expanded ENF (EENF) has been prepared for the project. The EENF responds to current environmental regulations and reflects the current proposed project. Comments received on the previous ENF have been reviewed and considered during the preparation of the current EENF.

1.3 Phase 1 Waiver

The EENF presents information to support the request for a Phase 1 Waiver which is provided in Section 2.

The City of Beverly submitted an application to the MassWorks Infrastructure Program for both design ($500,000) and construction ($5 million) of Phase 1. The Phase 1 waiver is being requested so that available funds can be used to construct the first phase of improvements in the fall of 2013 as required by the MassWorks grant program and to address the safety and access issues that are independent of Phase 2, the full build project.

In accordance with 301 CMR 11.11 (1), the Secretary may waive a requirement in the MEPA regulations if the requirement would:

a. *result in an undue hardship for the proponent,*
b. *not serve to avoid or minimize damage to the environment.*

Per 301 CMR 11.11(4): *In the case of a partial waiver of a mandatory EIR review threshold that will allow the Proponent to proceed with phase one of the Project prior to preparing an EIR, the Secretary shall base the finding required in accordance with 301 CMR 11.11(1)(b) on a determination that:*

(a) the potential environmental impacts of phase one, taken alone, are insignificant;
(b) ample and unconstrained infrastructure facilities and services exist to support phase one;
(c) the Project is severable, such that phase one does not require the implementation of any other future phase of the Project or restrict the means by which potential environmental impacts from any other phase of the Project may be avoided, minimized or mitigated; and
(d) the Agency Action on phase one will contain terms such as a condition or restriction in a Permit, contract or other relevant document approving or allowing the Agency Action, or other evidence satisfactory to the Secretary, so as to ensure due compliance with MEPA and 301 CMR 11.00 prior to Commencement of any other phase of the Project.

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massDOT Massachusetts Department of Transportation Highway Division

and the

City of Beverly

Data compiled from the following source: MassGIS, Commonwealth of Mass., Info. Technology Division

- *USGS Topo Quad Images: Dec. 1995 Salem and Marblehead North Quads*

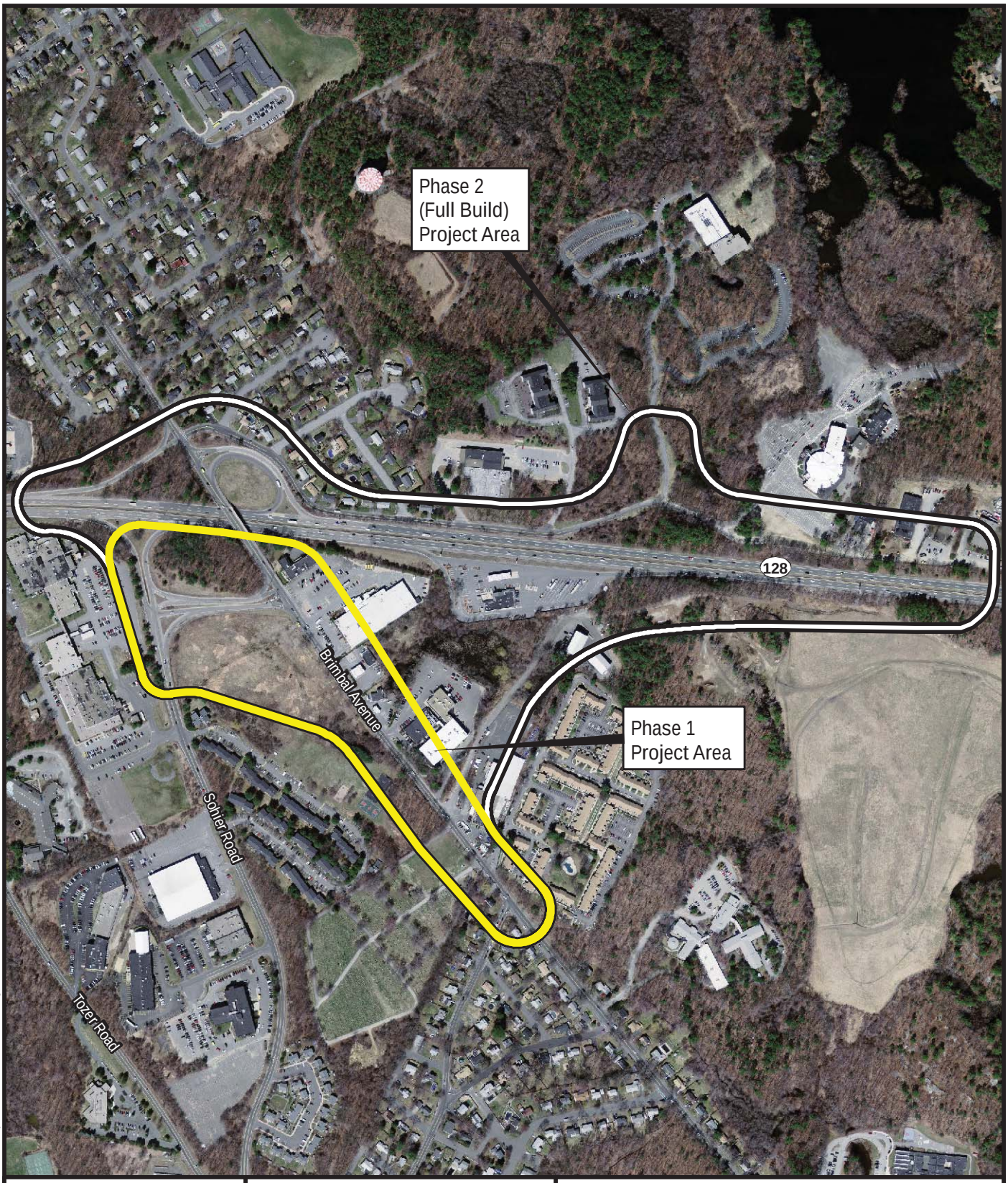
Approx. Scale in Feet

0 2,000

Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

LOCUS MAP

Figure 1-1



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massDOT
Massachusetts Department of Transportation
Highway Division

and the

City of Beverly

Data compiled from the following source: MassGIS, Commonwealth of Mass., Info. Technology Division

- *USGS Color Ortho Imagery: (2008/2009)*

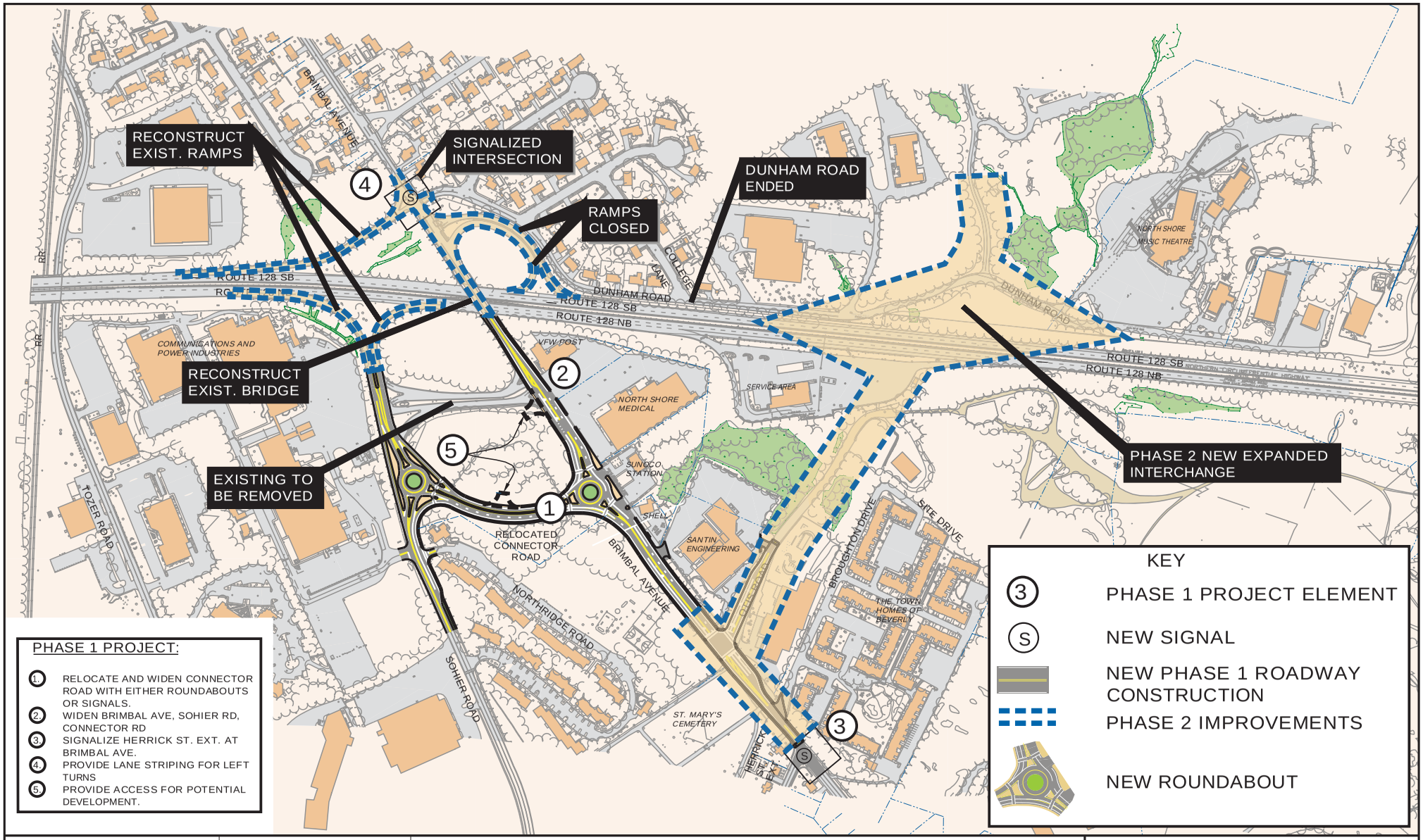
Approx. Scale in Feet

0 600

Route 128, Exit 19 at Brimbal Avenue
Interchange Improvements Project

DIGITAL ORTHOPHOTO LOCUS MAP

Figure 1-2



City of Beverly

massDOT Massachusetts Department of Transportation Highway Division

ROUTE 128, EXIT 19 AT BRIMBAL AVENUE INTERCHANGE IMPROVEMENTS PROJECT

N

0 500 FEET

PHASE 1 AND PHASE 2 (FULL BUILD) PROJECT RENDERING FIGURE 1-3

2. PHASE 1 PROJECT

2.1 Introduction

This section presents a description of the proposed Phase 1 project, an analysis of the environmental impacts of the Phase 1 project, a discussion of alternatives evaluated for Phase 1, and information to support the request for a Phase 1 Waiver. Potential development that might result from the Phase 1 improvements is also discussed.

The Phase 1 work has independent utility, severable from Phase 2 (Full Build) and will improve safety and relieve congestion along Brimbal Avenue. The Phase 1 roadway improvements will also provide the roadway layout and network to support anticipated development in the area. Granting the Phase 1 Waiver request would allow the City to use MassWorks funding that is programmed for Phase 1 of the project while a draft EIR is being prepared.

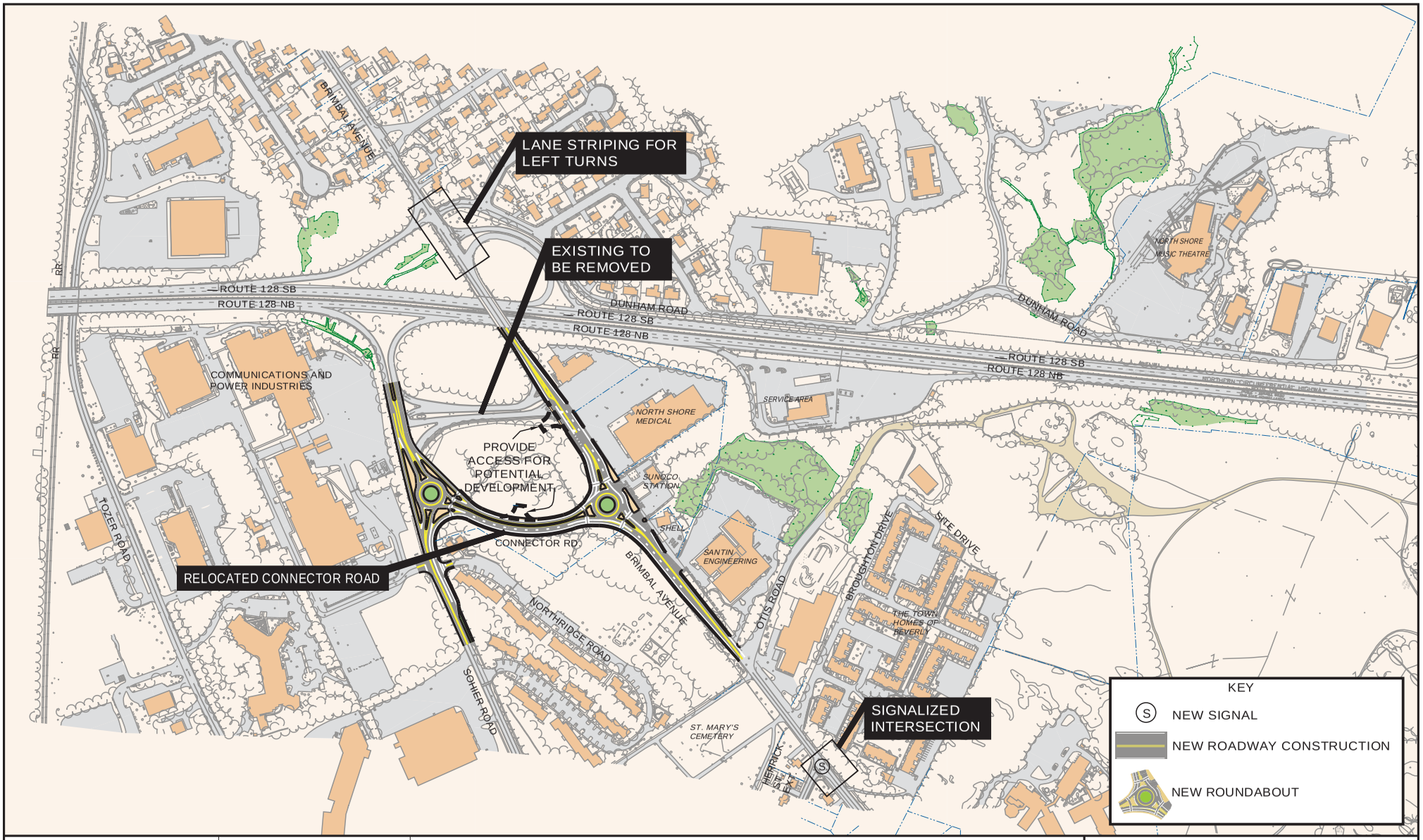
2.2 Phase 1 Roadway Improvements

Phase 1 includes roadway improvements to Brimbal Avenue, Sohier Road, and the Connector Road south of the Route 128 Interchange. Phase 1 is illustrated on Figures 2-1 and 2-2, and shown on project plans included with this submission. The project plans illustrate the signal option; however, a preferred option has not yet been determined.

The following elements would be completed as part of Phase 1:

- Brimbal Avenue will be widened from two lanes to four lanes for approximately 1,300 linear feet south of Route 128 for added capacity;
- The existing Connector Road will be relocated approximately 400 feet to the south, and widened for added capacity;
- The intersections of the Connector Road with Sohier Road and Brimbal Avenue will be signalized or constructed with roundabouts;
- The intersection of Herrick Street Extension with Brimbal Avenue will be signalized;
- Lane striping at the intersection of Rte. 128 SB on/off ramp and Dunham Road/Brimbal Avenue to create left turn storage lanes;
- Improvements will be made to sidewalks, drainage, roadway lighting; access driveways will be upgraded or provided where needed; and
- A detention infiltration recharge basin will be constructed adjacent to the relocated Connector Road to provide pretreatment of roadway stormwater prior to discharge to an existing outfall.

Relocating and widening the Connector Road will improve safety by creating longer storage lanes for vehicles coming off Route 128 northbound. The relocation of the Connector Road approximately 400 feet to the south would require a MassDOT Highway Division ROW process for Phase 1.



City of Beverly

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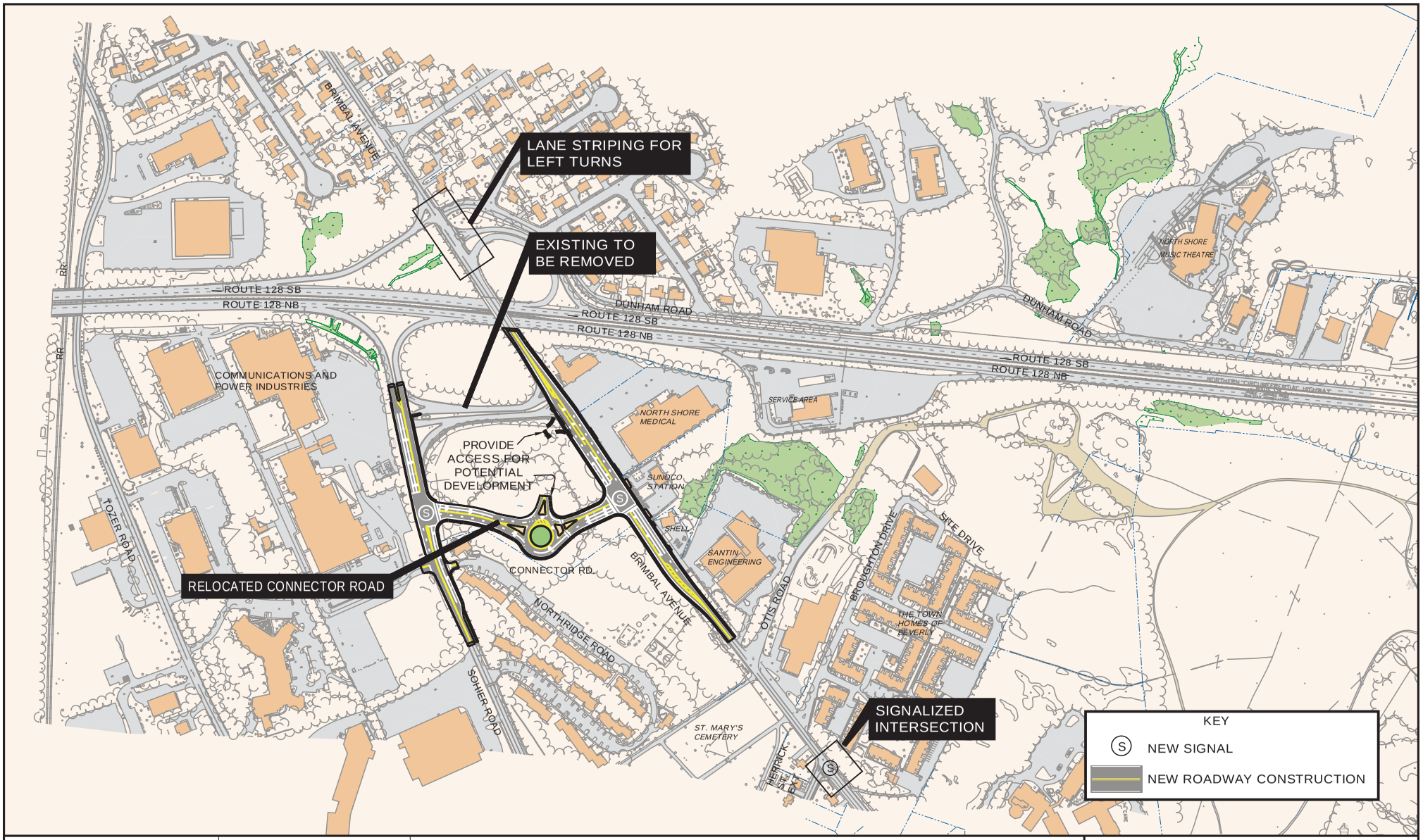
ROUTE 128, EXIT 19 AT BRIMBAL AVENUE
INTERCHANGE IMPROVEMENTS PROJECT

N

0 500 FEET

PHASE 1 CONNECTOR RD. WITH ROUNDABOUTS ALTERNATIVE

FIGURE 2-1



City of Beverly

massDOT Massachusetts Department of Transportation Highway Division

ROUTE 128, EXIT 19 AT BRIMBAL AVENUE
INTERCHANGE IMPROVEMENTS PROJECT

N

0 500 FEET

PHASE 1 CONNECTOR RD
WITH SIGNAL ALTERNATIVE

FIGURE 2-2

A traffic signal is warranted at the intersection of Herrick and Brimbal based on existing traffic data (Year 2012) and MUTCD signal warrants. Given the data collected at the intersection, there is a lack of adequate, safe, and available gaps in the Brimbal Avenue traffic stream for vehicles on Herrick Street Extension to enter.

The re-striping of lanes at the junction of the Route 128 SB on/off ramps and Dunham Road on Brimbal Avenue is proposed to provide additional turn lanes and storage bays within the existing pavement in order to facilitate better weekday peak hour traffic operations.

The edge of road and driveway access is not well defined along Brimbal Avenue. Improvements will be made to access driveways to improve safety and operations. Coordination has been carried out with adjacent business operators.

2.3 Phase 1 Traffic Analysis

The freeway, ramp junctions, weave section, and intersections in the study area have been examined and analyzed using Highway Capacity Manual methodologies under Year 2017 projected traffic conditions. Based on the analysis conducted, the roadway and intersection improvements proposed for Phase 1 are anticipated to provide adequate traffic operations and improved safety during the weekday peak periods.

The North Shore Commons project is anticipated to go forward as a result of the Phase 1 proposed infrastructure improvements. Based on information obtained from the City of Beverly, North Shore Commons would be a commercial development of approximately 77,500 square feet of commercial space. Based on available information, it is assumed that a separate ENF would be filed for this development project.

This and other potential development and redevelopment projects anticipated to go forward as a result of the Phase 1 project were included in the Phase 1 traffic analysis (Traffic Summary in Attachment 1). They are listed in Table 2-1 and are identified on Figure 2-3. Land use codes are provided in Table 2-2.

Phase 1 Anticipated Development/Redevelopment: *

1. Communication and Power Industries
2. North Shore Commons
3. Cell Signalling
22. Beverly Hospital Property
23. Beverly Hospital Property

* See Tables 2-1 and 2-2 for more information.

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- *USGS Color Ortho Imagery: (2008/2009)*

Approx. Scale in Feet

0 700

Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

Phase 1 POTENTIAL FUTURE DEVELOPMENT SITES

Figure 2-3

Table 2-1 Trip Generation for Phase 1 Potential Development

Land use (Development #- ITE Code-Owner	Added Square Footage	Added Employees	AM Peak Hour			PM Peak Hour			Weekend
			Auto	Alt. Modes	Total	Auto	Alt. Modes	Total	
Development 1- ITE 710-Comm. & Power Ind. [1.]	50,986	600	262	26	288	251	25	276	324
Development 2- ITE 820-Brimbal Ave. Dev. Corp.	90,000	250	82	8	90	305	30	336	4,497
Development 3- ITE 710-Cell Signaling	93,650	300	131	13	144	126	12	138	162
Development 22- ITE 610- Northeast Hospital	1,348	500	150	15	165	150	15	165	1,890
Development 23- ITE 610- Northeast Hospital	106,300	300	90	9	99	90	9	99	1,134

1. See Figure 2-3 for location of development sites.

Table 2-2 Land Use for Phase 1 Development

Development ID Number	ITE Code[1.]	Land Use
1	710	Office
2	820	Shopping Center
3	710	Office
22	610	Hospital
23	610	Hospital

1. Institute of Transportation Engineers, 8th Edition, 2008
See Figure 2-3 for locations and Table 2-1 for associated trip generation

2.4 Phase 1 Alternatives Considered

Alternatives were considered to address congestion and safety issues within the Phase 1 project area and to accommodate anticipated development within the area. The following table provides a summary of the alternatives analysis.

Table 2-3 Phase 1 Alternatives	
Alternative	**Evaluation**
Widen Brimbal Avenue; maintain existing Connector Road	Would not address inadequate storage for vehicles coming off Route 128 NB
Widen Brimbal Avenue and relocate Connector Road	Would not address inefficient intersection operations on both ends of Connector Road
Add signals to Connector Road	Signals were found to be efficient traffic control on both ends of Connector Road minimizing delays and queue lengths.
Add roundabouts to Connector Road	Would potentially create long queues on Connector Road at Brimbal Ave.

2.5 Phase 1 Environmental Impact Analysis

2.5.1 Introduction/Overview

The MassGIS database, information from the City of Beverly, and field investigations were used to characterize the surrounding environment and to identify elements of the environment with the potential for impacts in order to assess the impact of Phase 1 on the environment. As discussed below, no significant environmental impacts are anticipated with Phase 1. Figure 2-4 provides an overview of the environmental features for the Phase 1 project area. Information sent to the Massachusetts Historical Commission is included in Attachment 3.

Legend:

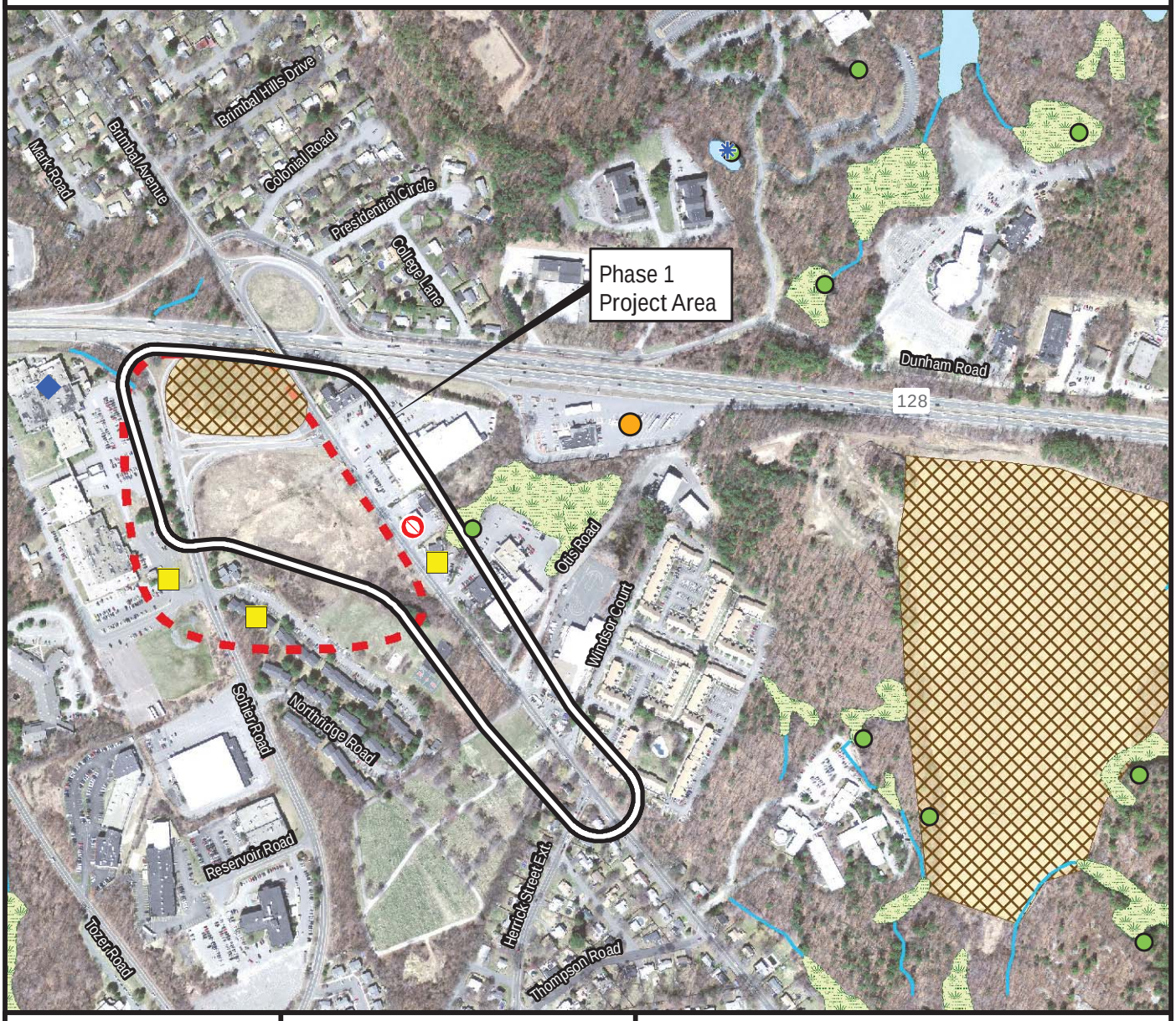
Hydrographic Features

- Wetlands
- Open Water
- Reservoir
- NHESP Certified Vernal Pools (MassGIS: April 2013)
- NHESP Potential Vernal Pools (MassGIS: December 2000)
- Noise model receptor locations

Hydrographic Linear Features

- Shoreline
- Hydrologic Connection
- Wetland Limit

- Activity and Use Limitation (AUL) Site (located on parcel on Brimbal Ave., outside of limit of work)
- Tier Classified Site (1C)
- Response Action Outcome Site (RAO - via MassDEP)
- Solid Waste Facilities (Closed/Inactive)
- Historic Limits of City Landfill (Digitized from the following report: ASTM Phase I Environmental Site Assessment, Dated Sept. 14, 2007, Prepared by: LFR, Inc.)



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Prepared For:

massDOT Massachusetts Department of Transportation Highway Division

and the

City of Beverly

Data compiled from the following source: MassGIS, Commonwealth of Mass., Info. Technology Division
- *DEP Wetlands (1:12,000): Dec. 2006*
- *Hydrography (1:25,000): February 2005*
- *Oil and/or Haz. Mat. Sites (AUL): January 2013*
- *Tier Classified Sites (21E): January 2013*
- *Land Disposal of Solid Waste: December 2011*

Approx. Scale in Feet

0 600

Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

Phase 1

ENVIRONMENTAL FEATURES

Figure 2-4

Table 2-4 Summary of Phase 1 Environmental Impacts

	With Roundabouts	With Traffic Signals	Notes
Wetlands	Work in 1,530 SF of Buffer Zone.	Work in 1,530 SF of Buffer Zone.	No change to Buffer Zone Characteristics.
Stormwater	Detention Basin and Deep Sump Catch Basins.	Detention Basin and Deep Sump Catch Basins.	Improvements to stormwater management.
Vernal Pools	No Impact.	No Impact.	Work in buffer Zone will not impact potential vernal pool.
Noise	No Noise Impacts	No Noise Impacts	Noise mitigation measures for construction phase.
Greenhouse Gas Emissions	Reduction of 367 Tons of CO_2.	Reduction of 337 Tons of CO_2.	Reducing congestion will improve GHG emissions.

2.5.2 Zoning

The City established the IR Overlay District in 2009 on a portion of Brimbal Avenue south of Route 128 to Broughton Drive and west to Sohier Road adjacent to Route 128 ramps. Land use in the project area largely reflects the zoning: office complexes, light industrial parks, storage, and support retail in the IR district with townhouses on Northridge Road. Additional information on zoning is provided in Section 4.2.

2.5.3 Greenhouse Gas Emissions

The Phase 1 project will reduce congestion which will result in CO_2 reduction. A Greenhouse Gas (GHG) emissions analysis was done for Phase 1 of the project after consultation with MEPA regarding the scope of the analysis.

The Phase 1 project is being funded in part by a MassWorks grant which is specifically designed to promote development and job creation. The traffic analysis for Phase 1 includes all anticipated development. The GHG analysis for the Phase 1 project includes emissions from the new trips (mobile sources) from the anticipated development and redevelopment. Stationary sources (buildings etc.) will be analyzed by others and reviewed by the City and/or MEPA when the developments are proposed.

Table 2-5, Year 2017 Estimated Average Daily Traffic, shows the vehicle trips on selected roads that might result from development after the Phase 1 roadway improvements. These trips have been included in the Greenhouse Gas Analysis.

Table 2-5 Year 2017 Estimated Average Daily Traffic

Road	Existing	Change	Total
1. Brimbal Avenue	15,090	4,200	19,290
2. Sohier Road	8,850	1,400	10,250
3. Otis Road	100	0	100
4. Tozer Road	5,930	600	6,530
5. Connector Road	9,420	3,810	13,230

Source: Traffic Summary, Jacobs, May 2013

Table 2-6, GHG Estimates for Transportation Improvements, shows the emissions under Existing (Baseline), 2017 No Build (includes background growth), and the 2017 Phase 1 Proposed Condition (includes background growth and trips from new development spurred by the roadway improvements). Phase 1 developments were assumed to be Developments 1 through 3 and 22 and 23 as shown on Figure 2-3 and discussed in the traffic study per guidance from the City. The No-Build volumes (grown at 0.5% per year) were summed with the site-specific development trips to produce 2017 and 2035 Build volumes. New development along the relocated Connector Road will undergo more review as it will require a MassDOT permit and could require MEPA review.

The change in emissions for the subject interchange was derived using the *Congestion Mitigation and Air Quality (CMAQ) Analysis Worksheet for Traffic Flow and Intersection Improvements* provided by MassDOT Office of Transportation Planning and MOBILE6. MOBILE6 is a computer program that estimates emissions of Hydrocarbons (HC), Carbon Monoxide (CO), Nitrogen Oxides (NOx), Carbon Dioxide (CO_2), Particulate Matter (PM), and other toxics from highway motor vehicles.

Three key intersections in the study area were identified as emission locations for Phase 1 and were examined for Year 2017 under Baseline (No Build) and Build conditions. These intersections are:

- Sohier Road at Connector Road;
- Brimbal Avenue at Connector Road; and,
- Brimbal Avenue at Route 128 SB On/Off Ramps.

The latest conditions for the emission rates for the CMAQ Air Quality Analysis Worksheet were obtained from EPA's *MOBILE 6 Air Quality Model*. Year 2017 No-Build and Build peak-hour intersection analysis results from Synchro and HCM 2010 calculations for roundabouts and signal alternatives were used in the analysis. Intersection volumes, peak hour factors, and movement delays were key inputs. Worksheets are provided in Attachment 2.

The Phase I roadway improvements have separate utility from the planned development project. Indirect CO_2 emissions from the roadway project alone using trips based on normal background growth have been estimated in order to separate emissions reductions that are not related to the planned development and under the control of MassDOT. Traffic congestion will be reduced which will result in improved air quality.

Both the roundabout and signal alternatives for the Phase 1 improvements will reduce congestion and reduce GHG as shown in Table 2.6. The roundabout design results in a slightly greater reduction. The Baseline (Existing) Condition assumes 9 percent of the trips will be made by transit, walking/cycling, and carpooling. The Phase 1 project will add and/or improve sidewalks to the new and upgraded roadways and include bike lanes.

The City has planned for development with updated zoning, and the City is committed to work with developers on TDM to reduce auto trips. Additionally, the City adopted the Stretch Building Code which took effect in July 2011. Compliance with the Commercial Stretch Code typically results in approximately 20% reduction in energy use in new developments.

In addition to the roadway improvements that will reduce congestion, the City will pursue a number of strategies and actions identified by the Metropolitan Area Planning Council (MAPC) with individual developers to improve non-automobile transportation to the future development sites. The City already has in place several tools that could reduce automobile trips:

- IR (Restricted Industrial) Overlay District allows for mixed-use commercial development that could reduce automobile trips
- The number of required off-street parking spaces may be reduced by special permit
- Shared parking is allowed within IR Overlay District

Table 2-6 GHG Estimates For Transportation Improvements

Condition	Annual Million Entering Vehicles (MEV)[1]	Annual Congestion in Vehicle Hours	Net change in CO_2 (Tons per Year)
2012 Baseline (Existing) Condition	8.91	283,792	NA
2017 No Build Condition with background growth[2]	9.15	355,709	+110
2017 Phase 1 Project[3]			
▪ Roundabout Alternative	11.47	43,463	-367
▪ Signal Alternative	11.47	63,147	-337

[1] Entering intersection volumes for Connector at Sohier, Connector at Brimbal, Brimbal at SB Off Ramp
[2] Background growth assumes 0.5% per year from regional growth in traffic
[3] Roadway improvements w/background and development traffic. Developments 1-3, 22, and 23 from the trip generation analysis presented in the FDR Traffic Study. See Figure 2-3 for site locations.

The City will prepare Transportation Demand Management (TDM) guidance for developers. Strategies recommended by MAPC to reduce the number of automobile trips generated by each proposed land use will be supplemented with other suggested mitigation measures identified in the *Greenhouse Gas Emissions Policy and Protocol* (MEPA, May 2010).

Beverly's TDM guidance would include a menu of strategies to:

- Provide site sidewalks, bicycle lanes, indoor bicycle storage, and bicycle racks and improve sidewalks and bicycle lanes on adjacent roads
- Not exceed minimum parking space requirements
- Offer alternate work schedules to limit the need for peak-period travel
- Join the North Shore Transportation Management Association or its successor
- Designate or hire a transportation manager to promote non-auto means to work
- Provide commuter shuttles connecting businesses with rail stations
- Provide free or subsidized transit passes
- Provide the opportunity for pre-tax dollars for carpool, transit, and bicycle commuting costs
- Provide preferred parking for carpools and fuel-efficient vehicles
- Accommodate and promote use of car-sharing
- Provide charging stations for electric vehicles
- Provide showers and a changing room for bike riders and walkers

- Provide on-site services like dry cleaning pick up, automated teller machines, and food services to reduce the need for off-site trips by employees
- Provide direct deposit of paychecks

2.5.4 Noise

A roadway noise study was performed to assess potential noise impacts for Phase 1 of the Project (*Noise Analyses for the Route 128/Interchange 19 Phase 1 Project*, Tech Environmental, May 2013). The analysis was conducted in accordance with the Federal Highway Administration (FHWA) Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 CFR 772) and the Massachusetts Department of Transportation (MassDOT) Type I Noise Abatement Guidelines.

A field sound measurement survey was completed to document community sound levels and included:

- short-term testing,
- a model calibration to compare and evaluate the predicted sound levels with the field-measured data, and the
- modeling of existing and future roadway sound levels at all noise sensitive locations (receptors) within the study area.

The opening year 2017 future alternatives included the No-Build and Build cases. A qualitative construction noise evaluation was performed including recommended mitigation measures.

Project area sound levels associated with the 1-hour traffic volumes for the Noisiest Traffic Hour (NTH) were calculated using the FHWA Traffic Noise Model (TNM), Version 2.5. Noise sensitive receptors were evaluated against the FHWA Noise Abatement Criteria (NAC). The MassDOT relative-increase criteria were employed to further determine the effects of the project on the exiting acoustic environment and to identify whether a noise impact condition would exist for each receptor.

As shown on Table 2-7, the TNM results show that the 2012 existing 1-hour Leq sound levels at the receptor locations range from 49 dBA (Northridge Road) to 67 dBA (129 Brimbal Ave.). The highest existing sound levels occur at homes and businesses closest to the proposed relocated Connector Road between Brimbal Avenue and Sohier Road. The TNM modeling results for the 2017 No-Build case predicted an overall increase of less than 1 dBA 1-hour Leq sound levels over the 2012 Existing case. The 2017 No-Build sound levels will also range from 49 to 67 dBA.

As shown on Table 2-7, the TNM modeling results for the 2017 Build case predicted no traffic noise impacts with regard to the incremental criterion of +10 dBA above the 2012 Existing case. The 2017 Build case will cause 1-hour Leq sound level changes of 0 to 3 dBA relative to the 2017 No-Build, and the 2017 Build sound levels will range from 49 to 67 dBA. No traffic noise impacts are predicted for both residential and commercial

receptors because the 2017 Build sound levels will be below 66 dBA and 71 dBA NAC, respectively. Thus, no noise mitigation is required.

Table 2-7 Traffic Noise Model (TNM) Modeling Results

Receptor ID	Receptor Address[2.]	NAC (dBA)[1]	Existing 2012	No-Build 2017	Build 2017	Increase Over No-Build	Noise Impact?
1	81 Northridge Road-1	66	59	59	63	3	No
2	81 Northridge Road-2	66	57	57	59	2	No
3	81 Northridge Road-3	66	52	52	54	2	No
4	81 Northridge Road-4	66	49	49	51	1	No
5	81 Northridge Road-5	66	49	49	50	1	No
6	81 Northridge Road-6	66	60	60	61	1	No
7	81 Northridge Road-7	66	54	54	55	1	No
8	81 Northridge Road-8	66	50	51	52	1	No
9	81 Northridge Road-9	66	49	50	51	1	No
10	81 Northridge Road-10	66	59	59	60	1	No
11	81 Northridge Road-11	66	53	53	55	1	No
12	143 Brimbal Avenue	71	66	66	67	1	No
13	133 Brimbal Avenue	71	61	62	62	1	No
14	131 Brimbal Avenue	71	64	64	65	1	No
15	129 Brimbal Avenue	71	67	67	67	1	No
16	123 Brimbal Avenue-1	71	64	64	64	1	No
17	123 Brimbal Avenue-2	71	63	63	64	1	No
18	150 Sohier Road-1	71	49	49	49	0	No
19	150 Sohier Road-2	71	50	50	52	2	No
20	150 Sohier Road	71	55	55	57	1	No

1. NAC (dBA) Noise Abatement Criteria (A-weighted decibel)
Source: *Noise Analyses for the Route 128/Interchange 19 Phase 1 Project*, Tech Environmental, May 2013
2. General locations are identified on Figure 2-4

Construction of the redesigned Route 128/ Interchange 19 Phase 1 Project will require the use of equipment that may be audible during peak construction activities. Noise mitigation measures will be implemented as needed to reduce temporary noise impacts:

2.5.5 Wetlands

Phase 1 of the project does not result in any permanent or temporary impacts to wetland areas. Approximately 1,530 SF of the Phase 1 project along Sohier Road is within the Buffer Zone of a Bordering Vegetated Wetland (BVW). Pursuant to the City of Beverly Wetland Ordinance, there is a Buffer Zone to Isolated Vegetated Wetlands (IVW). The Phase 1 project is adjacent to, but not within the Buffer Zone to the IVW. The existing Buffer Zone areas consist of roadway and parking lot pavements and grass slopes. No alteration to the existing Buffer Zone characteristics is anticipated. A Request for Determination of Applicability (RDA) will be submitted to the Beverly Conservation Commission for Phase 1 work within the Buffer Zone. Erosion controls will be implemented to protect wetland resources.

2.5.6 Stormwater

The relocation of the Connector Road provides an opportunity to improve stormwater quality, and construct a detention basin for pre-treatment of the roadway drainage prior to discharge.

Within the Phase 1 project limits, stormwater is currently untreated prior to discharge. The project proposes to collect the stormwater in new deep sump catch basins and direct the stormwater into a detention-recharge basin prior to discharge to the existing outfall. Stormwater treatment will also be provided in a vegetated bio-swale with stone sediment traps.

2.5.7 Solid Waste and Hazardous Materials Sites

As shown on Figure 2-4, a former City landfill (Sohier/Brimbal Landfill) is within the Phase 1 project area. Other solid waste and/or hazardous materials sites outside of the Phase 1 area, but within the Phase 2 (Full Build) project area, are identified in Section 4. Prior to construction of Phase 1, investigations and assessments will be completed in compliance with all applicable regulations regarding solid and hazardous waste.

The infield of the on ramp to Route 128 northbound between Sohier Road and Brimbal Avenue includes approximately 3 acres of the former landfill. Records indicate that the dump was in use from the 40s to the late 50s when it was phased out. The landfill was likely utilized for household waste, brush, and coal ash. It was covered with sand and gravel but not formally capped. It remains unlined and uncapped.

Additional investigations will be completed in accordance with all applicable regulations as part of the Phase 1 project.

2.6 Compliance with Phase 1 Waiver Standards

Pursuant to 301 CMR 11.11 (4), the Secretary may grant a Phase One Waiver:

"In the case of a partial waiver of a mandatory EIR review threshold that will allow the Proponent to proceed with phase one of the Project prior to preparing an EIR, the Secretary shall base the finding required in accordance with 301 CMR 11.11(1)(b) on a determination that:

> *(a) the potential environmental impacts of phase one, taken alone, are insignificant;*
> *(b) ample and unconstrained infrastructure facilities and services exist to support phase one;*
> *(c) the Project is severable, such that phase one does not require the implementation of any other future phase of the Project or restrict the means by*

which potential environmental impacts from any other phase of the Project may be avoided, minimized or mitigated; and
(d) the Agency Action on phase one will contain terms such as a condition or restriction in a Permit, contract or other relevant document approving or allowing the Agency Action, or other evidence satisfactory to the Secretary, so as to ensure due compliance with MEPA and 301 CMR 11.00 prior to Commencement of any other phase of the Project."

a) The potential environmental impacts of phase one, taken alone, are insignificant

RESPONSE: The Phase 1 project would not result in significant impacts to wetlands, public water supply, rare species, noise levels, or other natural resources. A Request for Determination of Applicability will be submitted to the Beverly Conservation Commission for work within the Buffer Zone. Stormwater management systems have been designed in accordance with DEP stormwater requirements. The project will treat roadway stormwater discharge currently not receiving any water quality treatment. The detention basin and other improvements at existing outlets proposed for the Phase 1 project will have a positive impact on stormwater quality.

b) Ample and unconstrained infrastructure facilities and services exist to support phase one

RESPONSE: Phase 1 is an infrastructure project to address congestion, safety, and capacity issues. The Phase 1 roadway improvements would support potential planned development.

c) The project is severable and phase one does not require the implementation of any other future phases of the overall project and does not restrict ways of avoiding, minimizing or mitigating future phases of the overall project.

RESPONSE: Phase 1 includes roadway improvements to Brimbal Avenue, Sohier Road, and the Connector Road south of the Route 128 Interchange. The Phase 1 work has independent utility and will improve safety and relieve congestion along Brimbal Avenue. It will also provide the roadway layout and network to support a limited amount of development in the area. Phase 1 would not restrict mitigation for Phase 2.

d) The agency action on phase one will comply with MEPA regulations prior to completion of other phases of the project

RESPONSE: MassDOT and the City of Beverly will include conditions that require compliance with MEPA prior to any work on Phase 2 (Full Build). The draft and final EIR will be completed prior to any work on Phase 2.

3. PHASE 2 (FULL BUILD) RANGE OF ALTERNATIVES

3.1 Introduction

Three alternative concepts have been evaluated for the **Phase 2 (Full Build)** phase of the project:

- Concept 1 — Reconstruct the Existing Interchange
- Concept 2 — Reconstruct the Existing Interchange with a New Overpass
- Concept 3 — Expand the Interchange
  - Option A — Expand the Interchange with a Single Point Urban Interchange
  - Option B — Expand the Interchange with a Diamond Interchange with Signals
  - Option C — Expand the Interchange with a Diamond Interchange with Roundabouts
  - Option D — Expand the Interchange with a Modified Diamond Interchange

The preferred concept (Concept 3) is an expanded interchange. The additional Route 128 exit NB and Route 128 entrance SB are key to the long-term operations of the reconstructed Exit 19 interchange. Concept 3 includes several options that build on the more compact diamond interchange concept that work from a traffic operations perspective, minimize environmental impacts, and limit right-of-way impacts. The major components of this modified diamond concept are a new overpass over Route 128 and individual exit/entrance movements to/from Route128.

Four options for Phase 2 (full build) under Concept 3 are discussed and a specific preferred alternative will be identified for the Draft EIR. The expanded interchange would reconstruct the Brimbal Avenue Bridge and remove the SB on/off ramps from the existing interchange. A new bridge over Route 128 in the vicinity of Otis Road would be constructed with new on and off ramps.

3.2 Alternatives Development

Concepts were screened and evaluated under the following criteria:

- address operational safety (substandard ramps, crash rates, queuing);
- relieve congestion;
- provide capacity and improved access to undeveloped and underdeveloped parcels;
- Maintain adequate vehicle level of service (LOS D or better) on Route 128 and other roadways;
- Avoid and minimize environmental impacts.

3.3 No Build

The No Build alternative would maintain the existing interchange and roadway network without any improvements. Neither the Phase 1 nor the Phase 2 (Full Build) project would be completed. Congestion and sub-standard ramps would not be addressed. Development or redevelopment of area parcels may or may not occur.

The No Build alternative has been evaluated in terms of the project objective. This alternative would:

- Not address substandard roadway geometry;
- Not address congestion on local roads due to lack of separation of local and regional traffic;
- Not address congestion and safety on interchange ramps;
- Not address projected traffic operational failures at five stop controlled intersections at the interchange and in the vicinity;
- Not improve access to developable parcels.

Therefore, the No Build alternative has not been selected.

3.4 Concept 1 Reconstruct the Existing Interchange

The Reconstruct the Existing Interchange alternative has been developed to address existing congestion, accommodate anticipated development, and improve ramp geometry within the existing interchange footprint.

The feasibility of various modifications to the existing ramps, including using the "infield" between the Connector Road and Route 128 to construct ramps was considered during the development of this alternative.

Illustrated in concept on Figure 3-1 provided at the end of this section, this alternative would include the following improvements:

- Four new traffic signals and additional turn lanes at the intersections along Brimbal Avenue and Sohier Road;
- The SB on-ramp from Brimbal Avenue would be closed;
- The Brimbal Avenue bridge and Tozer Road bridge would be replaced with wider bridges;
- The existing Route 128 NB off-ramp to Sohier Road would be widened to a two lane exit and the deceleration lane on Route 128 would be extended 2,000 feet southwest over and beyond the Tozer Road bridge to Exit 20;
- Brimbal Avenue and the Connector Road would be widened.

The Reconstruct the Existing Interchange alternative has been evaluated in terms of the project objectives. In order to provide an acceptable Level of Service and to maintain traffic operations, this alternative would require residential land takings for roadway lane expansions. For example land takings would be required for:

- Triple left turn lanes for the northbound Brimbal Avenue approach to head south on Route 128 at the intersection of Brimbal Avenue and Dunham Road;
- Triple left turn lanes for the southbound Sohier Road approach to turn onto the Connector Road at the intersection of Sohier Road and the Connector Road;
- Widening to two lanes for the NB off ramp to Sohier Road.

Additionally, the deceleration lane would extend back to the bridge over Tozer Road to accommodate anticipated traffic demand. The Tozer Road Bridge would be widened or replaced. To accommodate the lane transitions, the Route 1A Interchange 20 would likely need to be reconstructed.

Finally, this alternative would have insufficient access and Route 128 ramp capacity for future developments anticipated north and south of Route 128. On the north, Dunham Road does not have the vehicular capacity (or functional classification) to facilitate new development traffic. On the south, Otis Road does not have the vehicular capacity (or functional classification) to serve new development traffic.

Therefore, the Reconstruct the Existing Interchange concept was not selected.

3.5 Concept 2 Reconstruct the Existing Interchange with a New Overpass

The Reconstruct the Existing Interchange with a New Overpass alternative has been developed to address existing congestion, accommodate anticipated development within the existing interchange footprint and with a new overpass but without additional ramps. As illustrated in concept on Figure 3-2 provided at the end of this section, this alternative would include the following improvements:

- Eight new signals and intersection lane additions at the interchange;
- Reconstruct and widen Otis Road alignment and connect to the overpass to provide access to future developments north and south of Route 128;
- Replace the Brimbal Avenue Bridge and Tozer Road Bridge to provide additional capacity and lane widening;
- Widen the existing NB off ramp to Sohier Road and extend 2,000 feet back beyond the bridge over Tozer Road and replace the Tozer Road Bridge;
- Widen the existing the NB off-ramp to Sohier Road;
- Widen Brimbal Avenue and the Connector Road;
- Remove the SB on ramp to Route 128 from Brimbal Avenue northbound; the existing SB on ramp from southbound Brimbal Avenue would be widened and signalized.

The Reconstruct the Existing Interchange With a New Overpass alternative has been evaluated in terms of the project objectives.

This alternative would require significant adverse residential land takings for roadway lane expansions. For example land takings would be required for:

- Triple left turn lanes for the southbound Sohier Road approach to turn onto the Connector Road;
- Widening the existing Route 128 NB off ramp to Sohier Road 2,000 feet back beyond the bridge over Tozer Road;
- Reconstruction of the Route 128 SB on ramp from Brimbal Avenue to address horizontal/vertical alignment deficiencies.

However, even with all the above listed improvements, traffic operations would not operate at an adequate level of service because of the limited connectivity and available capacity of the existing ramps. Additional ramps are needed.

Therefore, the Reconstruct the Existing Interchange with a New Overpass concept has not been selected.

3.6 Concept 3-Option A Expand the Interchange with a Single Point Urban Interchange

Concept 3 has been developed to address existing congestion, improve ramp geometry, and accommodate anticipated development with modifications to the existing interchange and a new bridge with new ramps for an expanded interchange.

The Expand the Interchange with a Single Point Urban Interchange (SPUI) alternative is illustrated in concept on Figure 3-3, provided at the end of this section. It assumes that the Phase 1 improvements have been completed and would include the following improvements:

- A new overpass bridge and ramp system would be constructed east of the existing interchange;
- Seven new signals and intersection lane additions;
- Otis Road would be widened along the Otis Road alignment and connected to the interchange to provide access to future developments north and south of Route 128;
- The SB off/on ramps at Brimbal Avenue would be closed and access would be provided through the expanded interchange;
- The NB on ramp from Sohier Road would be closed and access would be provided through the expanded interchange;

- Herrick Street Extension would be widened at the intersection with Brimbal Avenue;
- The Tozer/Sohier Road intersection would be signalized and widened for turn lanes.

The SPUI alternative has been evaluated in terms of the project objectives. In order to maintain traffic operations, this alternative would require significant adverse residential land takings for roadway lane expansions. The SPUI bridge would be approximately 100 feet wide spanning over Route 128 (6 travel lanes, median, bike lanes, and sidewalks).

3.7 Concept 3-Option B & C Expand the Interchange with a Diamond Interchange

Concept 3 has been developed to address existing congestion, improve ramp geometry, and accommodate anticipated development with modifications to the existing interchange and a new bridge with new ramps for an expanded interchange.

The Expand the Interchange with a Diamond Interchange alternatives is illustrated in concept on Figures 3-4 and 3-5, provided at the end of this section. It assumes that the Phase 1 improvements have been completed and would include the following improvements:

- A new overpass bridge and ramp system would be constructed east of the existing interchange with either Signals (Option B) or roundabouts (Option C);
- Otis Road would be widened and connected to the interchange to provide access to future developments north and south of Route 128. Option A would connect Otis Road with Route 128 with signals. Option B would use roundabouts;
- The SB on and off ramps at Brimbal Avenue would be closed and access would be provided through the expanded interchange;
- Herrick Street Extension would be widened at the intersection with Brimbal Avenue;
- The Tozer/Sohier Road intersection would be signalized and widened for turn lanes.

3.8 Concept 3-Option D Expand the Interchange with a Modified Diamond

Concept 3 has been developed to address existing congestion, improve ramp geometry, and accommodate anticipated development with modifications to the existing interchange and a new bridge with new ramps for an expanded interchange.

The Expand the Interchange with a Modified Diamond alternative is illustrated in concept on Figure 3-6, provided at the end of this section. It assumes that the Phase 1 improvements have been completed and would include the following improvements:

- Eight new signals and intersection lane additions are proposed at the interchange;
- Otis Road would be widened along the Otis Road alignment to provide access to future developments north and south of Route 128;
- The SB on and off ramps at Brimbal Avenue would be closed and access would be provided through the expanded interchange;
- Herrick Street Extension would be widened at the intersection with Brimbal Avenue;
- The Tozer/Sohier Road intersection would be signalized and widened for turn lanes.

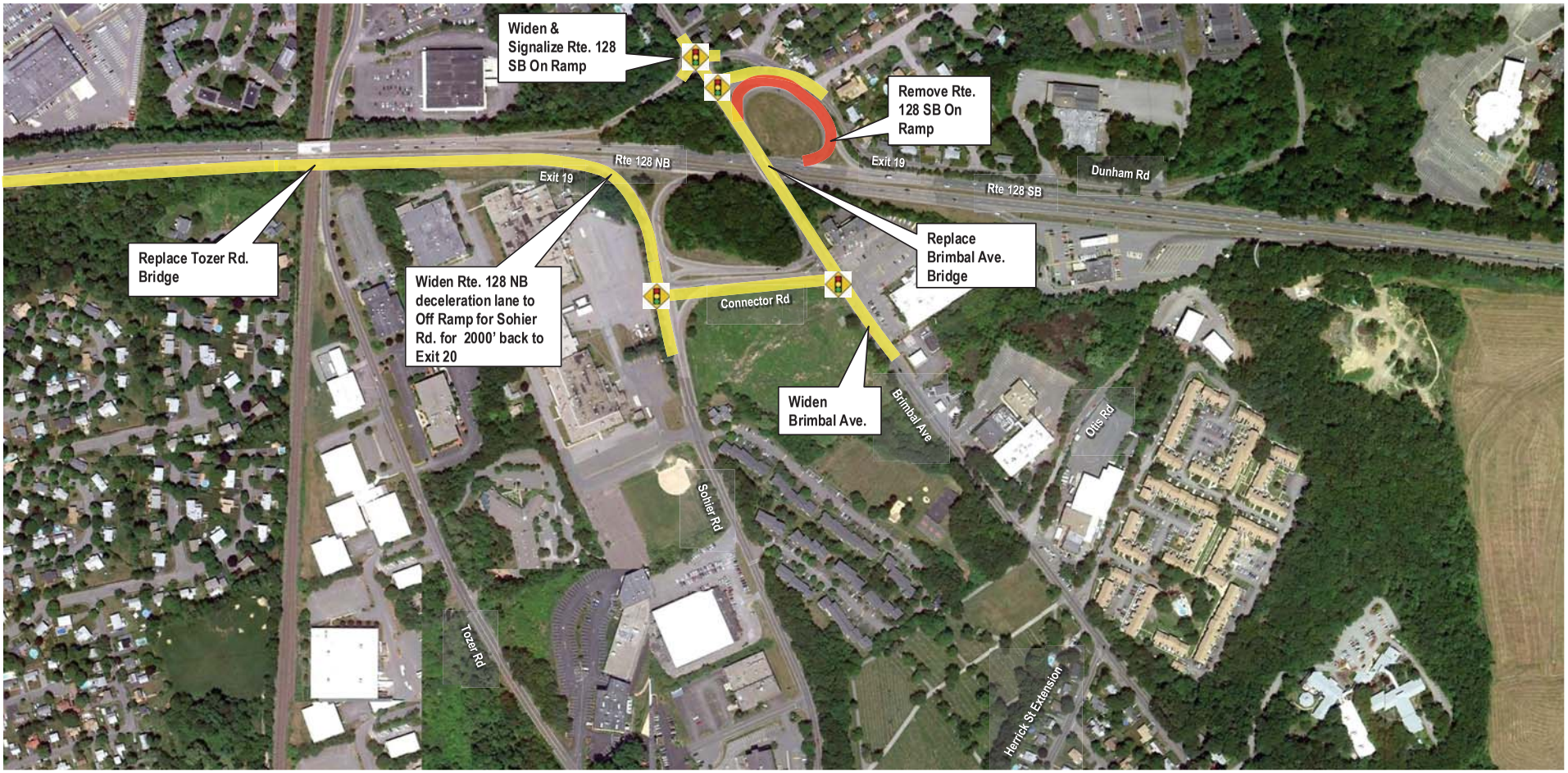
The Modified Diamond alternative has been evaluated in terms of the project objectives. It is similar to the Diamond Interchange (Options B & C), except that the NB off ramp goes underneath Otis Road and ties into a site drive roadway (proposed by others) on the other side of the bridge. From this new intersection, the NB on and off ramp traffic movements would be facilitated, lessening the traffic intensity seen at the intersection of Otis Road and the NB off ramp as proposed under the Diamond Interchange.

3.9 Potential Environmental Impacts of Phase 2 (Full Build) Alternatives

The environmental impacts of the Phase 2 (Full Build) alternative concepts will be fully evaluated in the Draft EIR. Preliminary assessments have been done and are summarized in the following Table 3-1.

Table 3-1 Summary of Environmental Impacts of Phase 2 (Full Build) Alternatives

	No Build	**Concept 1**	**Concept 2**	**Concept 3**
Wetlands	No Impacts	Impacts to BVW adjacent to Route 128 and Sohier Road. Estimate of approximately 2,000 SF of BVW.	Impacts to BVW adjacent to Route 128 and Sohier Road and IVWs adjacent to Otis Road. Estimate of approximately 2,000 SF of BVW and 35,000 SF of IVW.	Impacts to BVW adjacent to Route 128 and Sohier Road and IVWs adjacent to Otis Road. Estimate of approximately 2,000 SF of BVW and 35,000 SF of IVW.
Stormwater	Untreated stormwater will continue to discharge to downstream receiving water	Will be designed to comply with DEP stormwater regulations.	Will be designed to comply with DEP stormwater regulations.	Will be designed to comply with DEP stormwater regulations.
Vernal Pools (Potential and Certified)	No Impact	No direct impacts to vernal pools. Project may be within vernal pool protected buffer zone on Brimbal Avenue.	No direct impacts to vernal pools. Project may be within vernal pool protected buffer zone.	No direct impacts to vernal pools. Project may be within vernal pool protected buffer zone.
Noise	No Change	TBD. Noise abatement may be needed for Phase 2.	TBD. Noise abatement may be needed for Phase 2.	TBD. Noise abatement may be needed for Phase 2.
Greenhouse Gas Emissions	May increase with increase in congestion over time.	TBD.	TBD.	TBD.
Solid Waste and Hazardous Material	No Change	May encounter contaminated soils.	May encounter contaminated soils.	May encounter contaminated soils.
Traffic	No Improvements	Does not address ramp deficiencies	Does not address ramp deficiencies	Addresses ramp deficiencies and improves access.



massDOT
Massachusetts Department of Transportation
Highway Division

City of Beverly

LEGEND

New Signal
Roadway Improvements / New Roadways
Ramp Removal

Map Source: Google Earth 2012

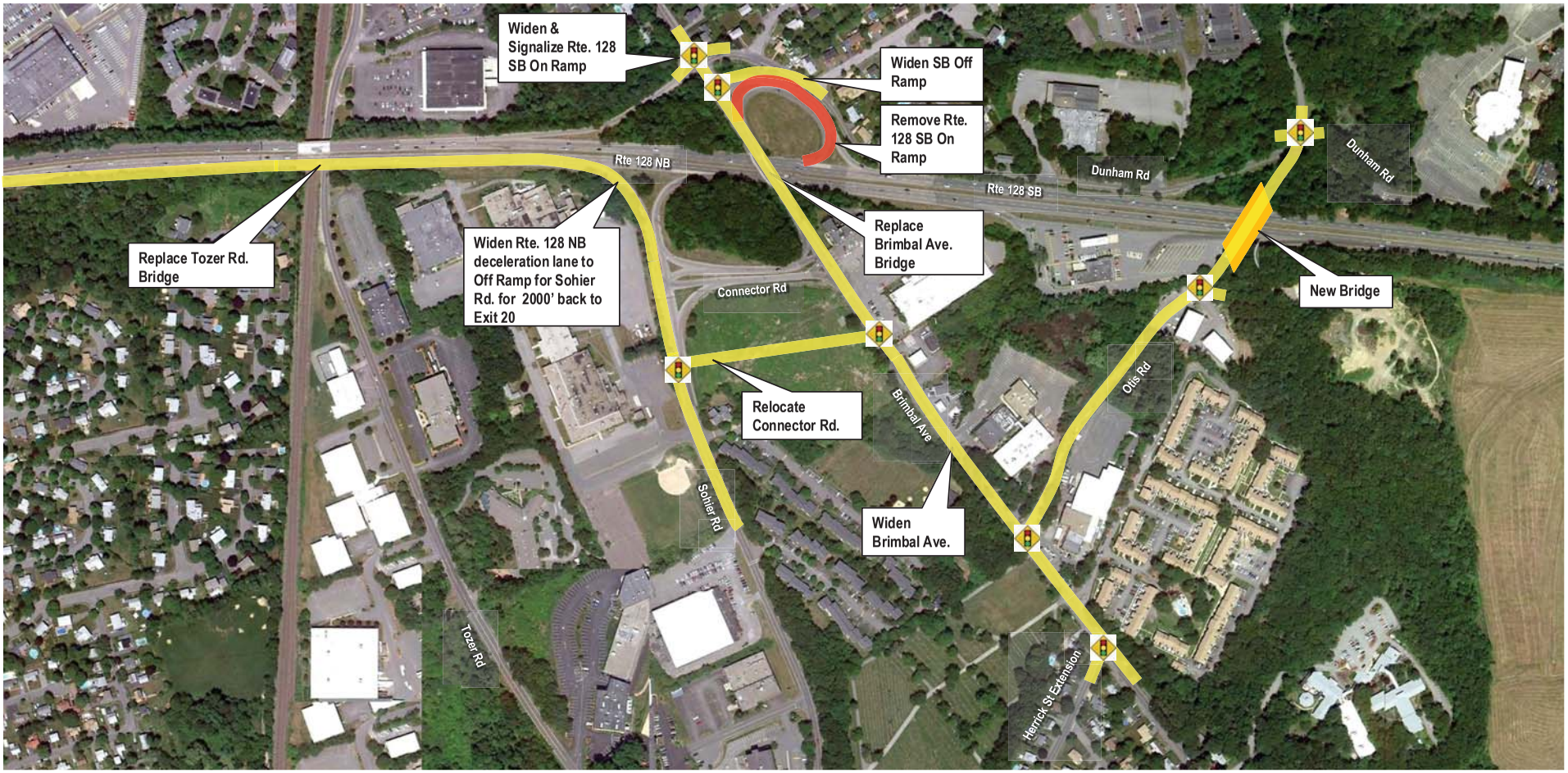
APPROXIMATE SCALE IN FEET

0 350 700

Route 128, Exit 19
Interchange Improvements Project

CONCEPT 1:
RECONSTRUCT
EXISTING INTERCHANGE

Figure 3-1



massDOT
Massachusetts Department of Transportation
Highway Division

City of Beverly

LEGEND

New Signal
Roadway Improvements / New Roadways
Ramp Removal
New Bridge

Map Source: Google Earth 2012

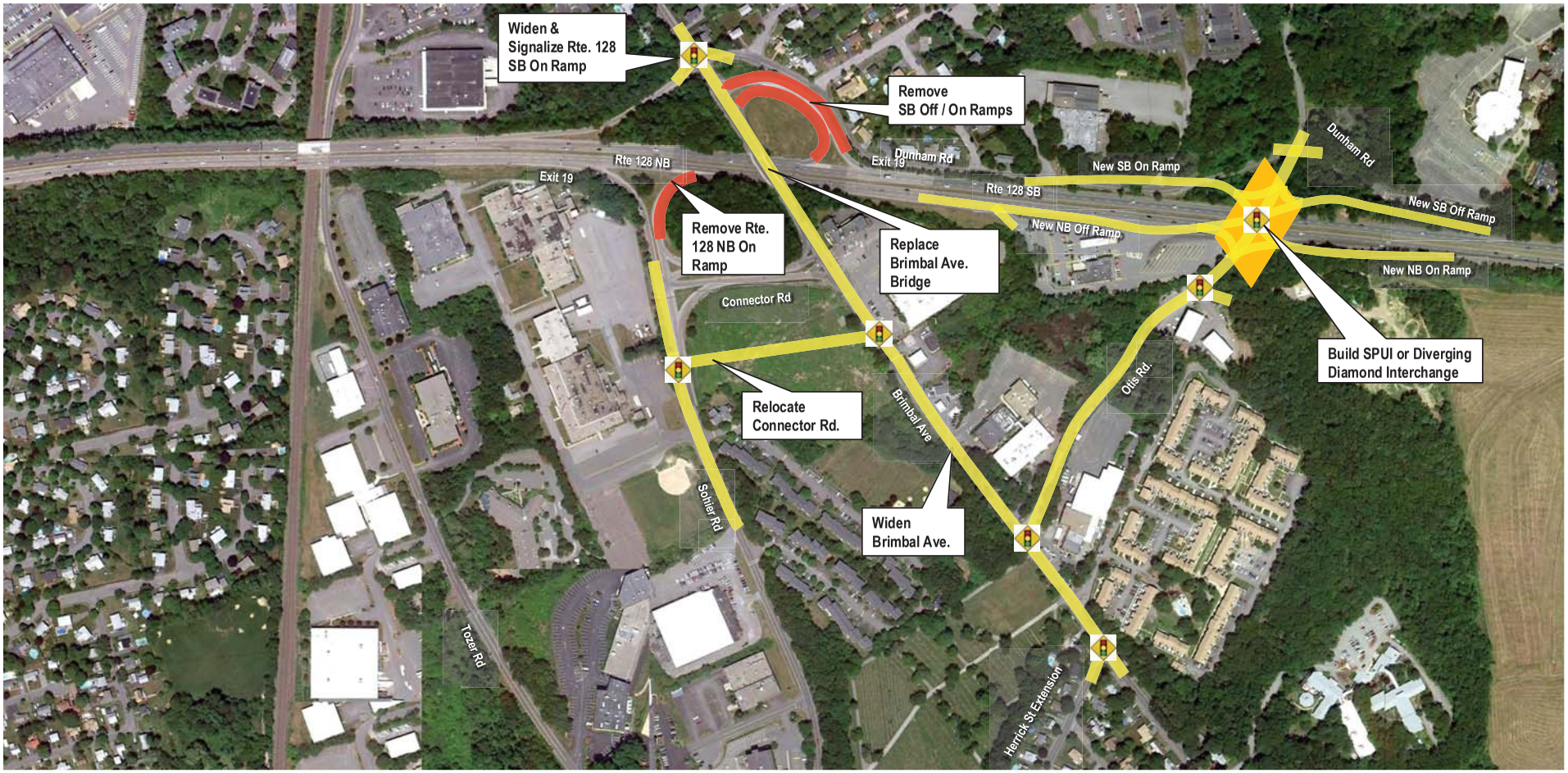
Approximate Scale in Feet

0 350 700

Route 128, Exit 19
Interchange Improvements Project

CONCEPT 2:
RECONSTRUCT EXISTING INTERCHANGE WITH NEW OVERPASS

Figure 3-2



massDOT Massachusetts Department of Transportation Highway Division

City of Beverly

LEGEND

New Signal

Roadway Improvements / New Roadways

Ramp Removal

New Bridge

Map Source: Google Earth 2012

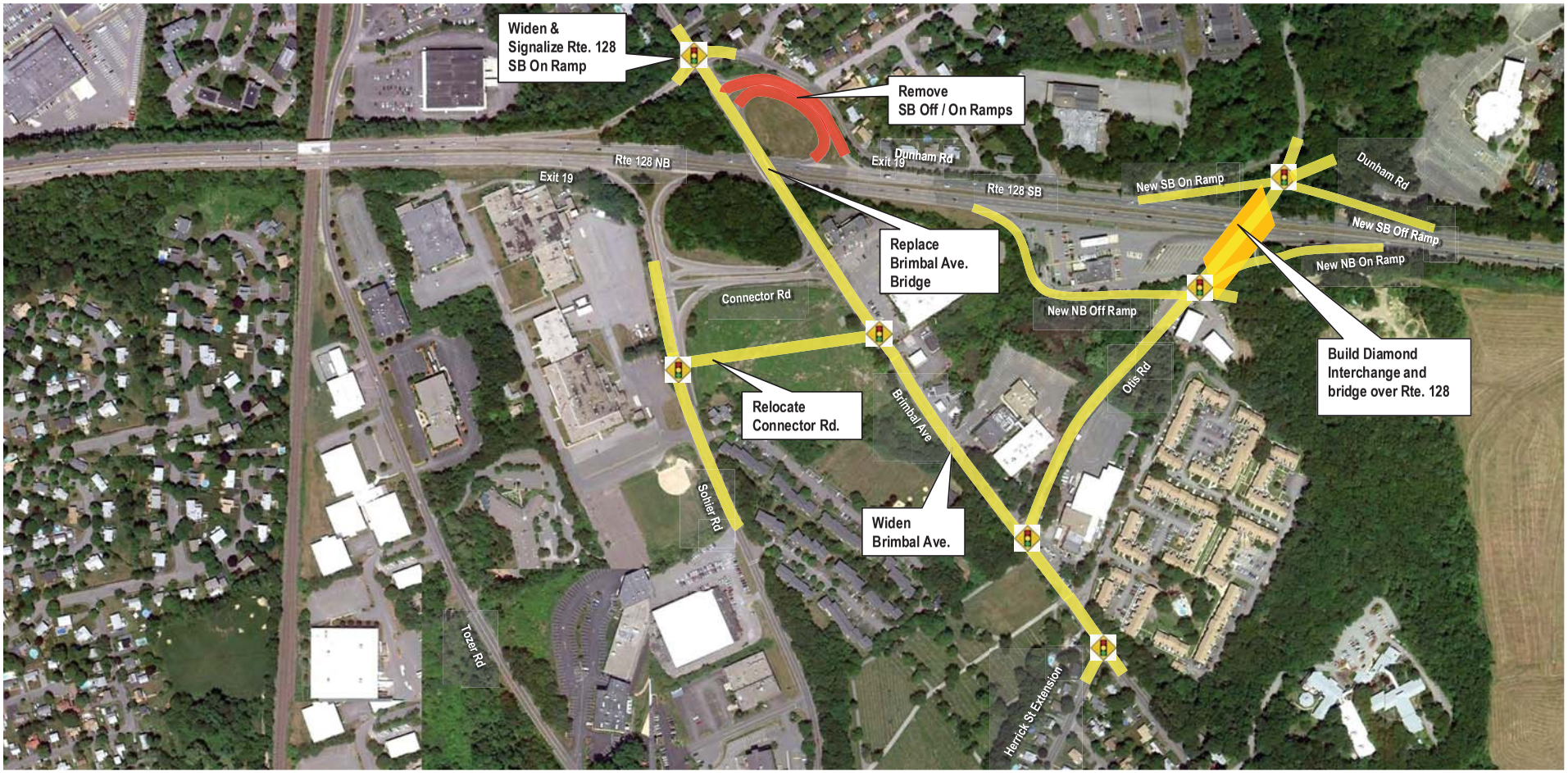
Approximate Scale in Feet

0 350 700

Route 128, Exit 19
Interchange Improvements Project

CONCEPT 3 – EXPAND INTERCHANGE: *OPTION A,* SINGLE POINT URBAN INTERCHANGE (SPUI)

Figure 3-3



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City of Beverly

LEGEND

New Signal
Roadway Improvements / New Roadways
Ramp Removal
New Bridge

Map Source: Google Earth 2012

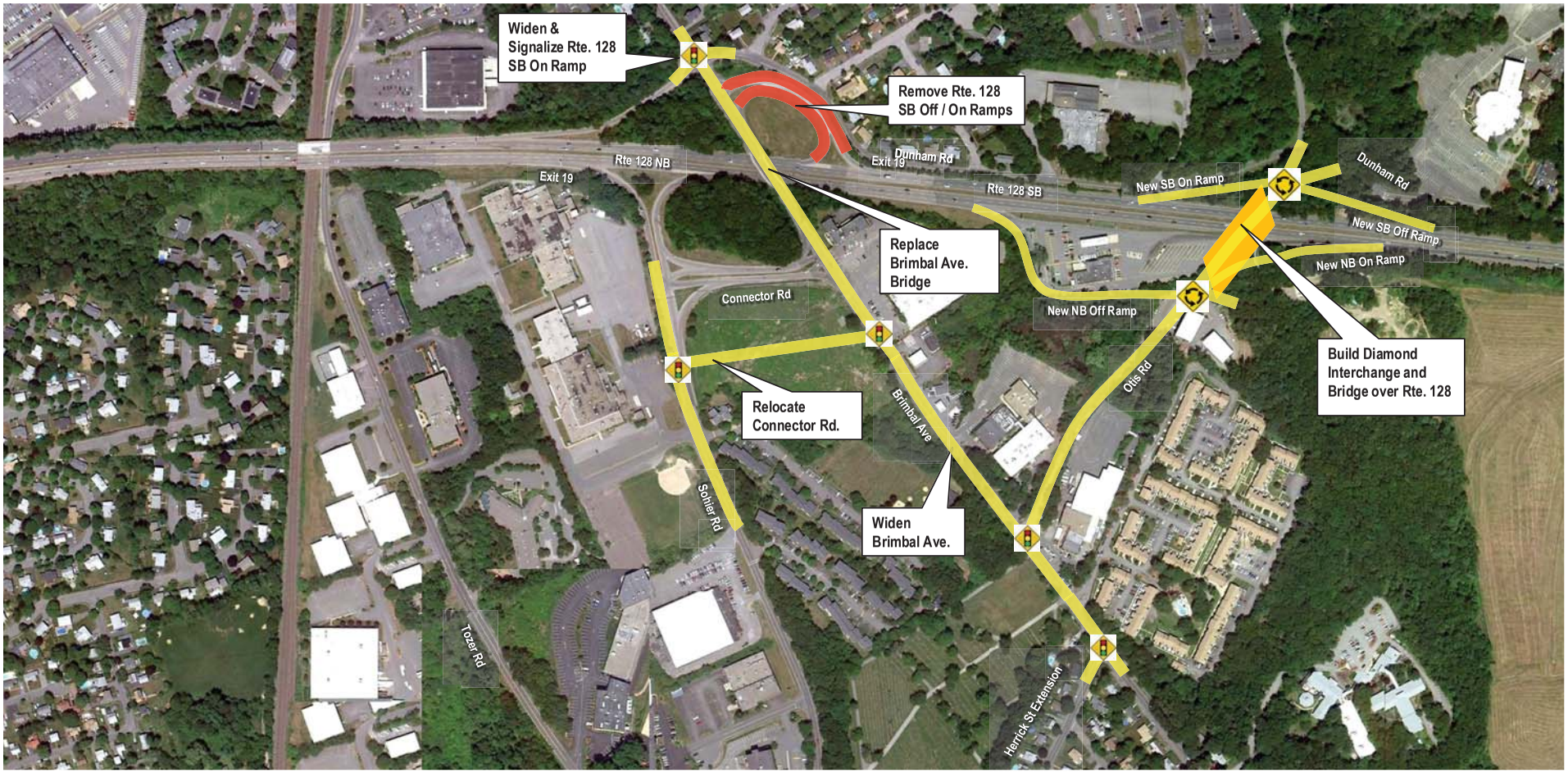
Approximate Scale in Feet

0 350 700

Route 128, Exit 19
Interchange Improvements Project

CONCEPT 3 - EXPAND INTERCHANGE:
***OPTION B*, DIAMOND INTERCHANGE**
(Signals Option)

Figure 3-4



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City of Beverly

LEGEND

New Signal
New Roundabout
Roadway Improvements / New Roadways
Ramp Removal
New Bridge

Map Source: Google Earth 2012

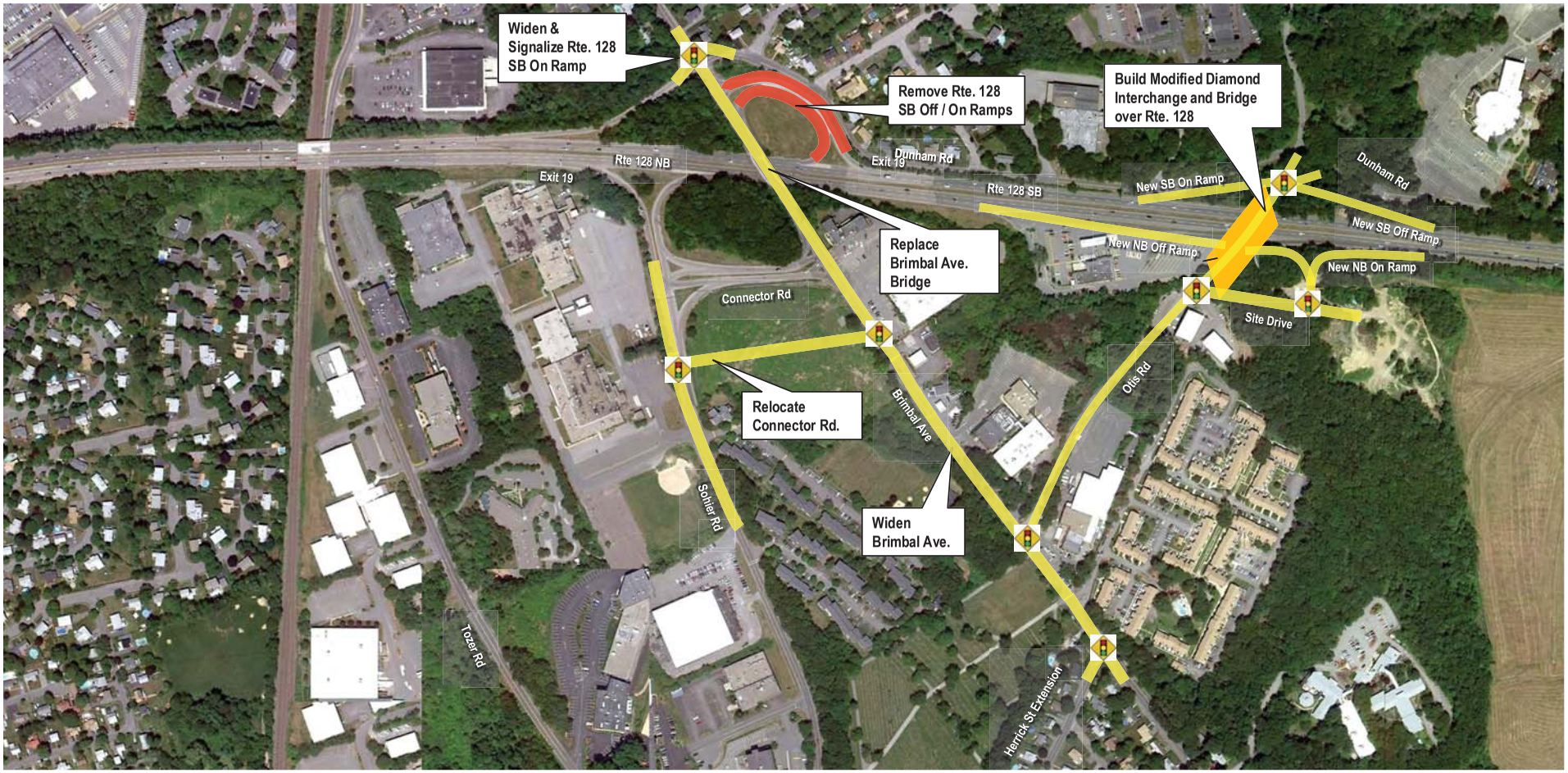
Approximate Scale in Feet

0 350 700

Route 128, Exit 19
Interchange Improvements Project

CONCEPT 3 – EXPAND INTERCHANGE: *OPTION C*, DIAMOND INTERCHANGE (Roundabouts Option)

Figure 3-5



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City of Beverly

LEGEND

- New Signal
- Roadway Improvements / New Roadways
- Ramp Removal
- New Bridge

Map Source: Google Earth 2012

Approximate Scale in Feet

0 350 700

Route 128, Exit 19
Interchange Improvements Project

CONCEPT 3 – EXPAND INTERCHANGE: *OPTION D*, MODIFIED DIAMOND INTERCHANGE

Figure 3-6

4. EXISTING ENVIRONMENT

4.1 Introduction

The MassGIS databases, the City of Beverly GIS database, field investigations, and planning documents have been reviewed to obtain an understanding of the environmental resources and constraints within the project area.

Much of the project area consists of industrial, commercial and other developed land, and some categories of the environment are not present. This section gives an overview of the natural and build environment within the project area.

4.2 Existing Zoning, Land Use and Potential Development Projects

Zoning in the majority of the project area is IR (restricted industrial). Small portions of the project area north of Route 128 are zoned RHD (residential multi-family high density) and R10 (one-family residential, urban density). Condominiums and townhouses dominate the RHD and RMD (residential multi family medium density) districts. The North Shore Music Theatre is a major land use in the IR district north of Route 128. North of Dunham Road beyond the project area, the land west of Norwood Pond is zoned MOSRC (municipal open space and recreation). The zoning within or near the project area is shown on Figure 4-1.

In 2009 the City established the IR Overlay District in the project area which adds flexibility in the IR district. The overlay district was established to provide principally for mixed-use commercial development including retail and restaurants by Special Permit.

Development continues gradually throughout the study area. The Metropolitan Area Planning Council (MAPC) in 2011 identified over 100 acres of IR-zoned land north of Route 128 for commercial expansion. It identified about 88 acres of land zoned IR southwest of Brimbal Avenue adjacent to Beverly Hospital and existing development. MAPC identified about 94 acres of land zoned IR northeast of Brimbal Avenue; the capped landfill is included in this sub-area. In addition, underutilized parcels along Brimbal Avenue and Sohier and Tozer Roads could be redeveloped more intensively in the future.

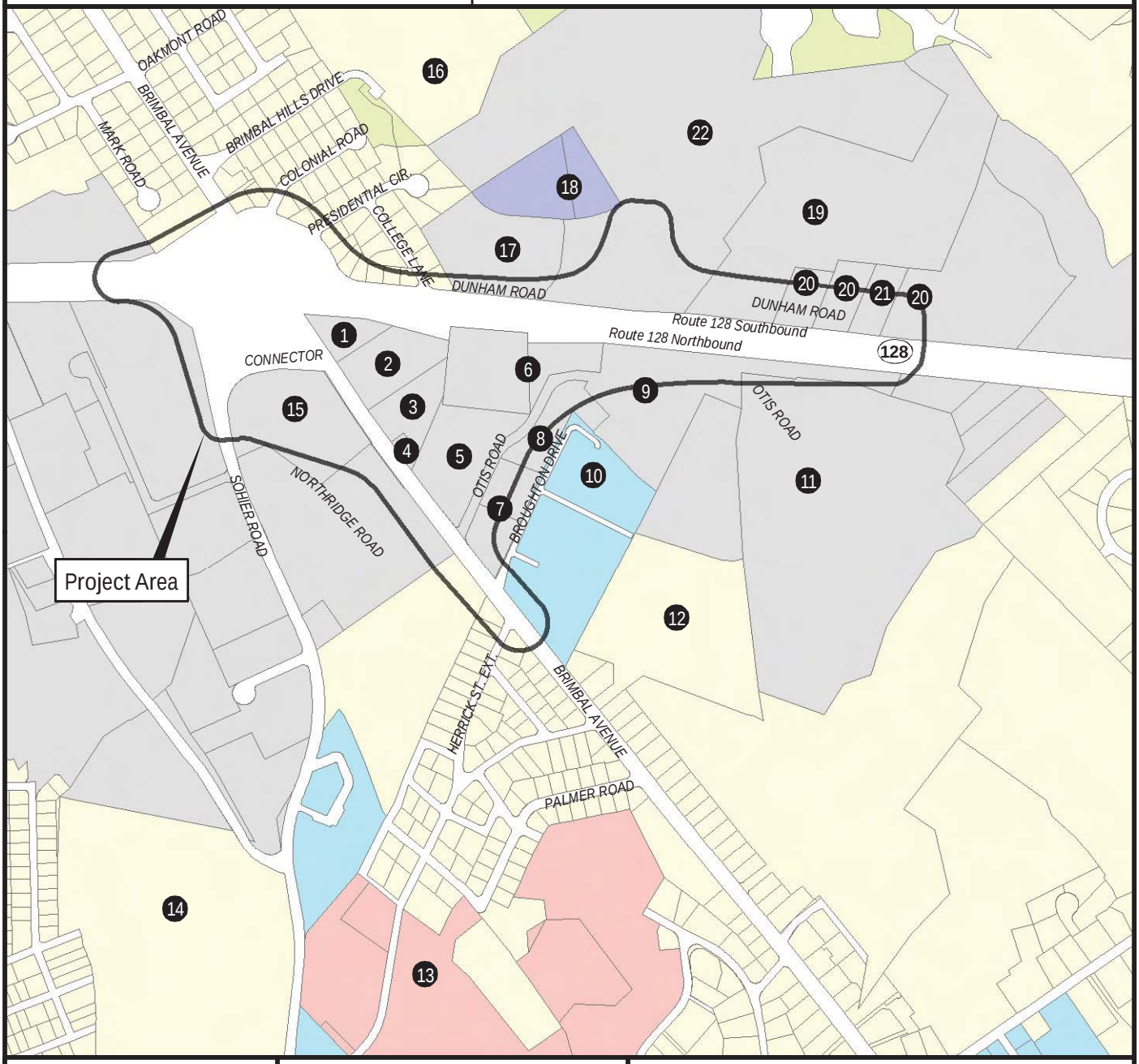
Legend:

Zoning

- Industrial
- Residential
- Multi-family
- High Density Multi-family
- Open Space Recreational
- Health Care

#	Property Type
1	Fraternal Organization
2, 3	Office and Medical
4	Gas Station
5	Office
6	Commercial - highway service area
7	Commercial - motor vehicle sales
8	Industrial - condos
9	Undeveloped land
10	Residential - apartments
11	Closed Municipal Landfill

#	Property Type
12	Commercial - Nursing Home
13	Hospital
14	Beverly High School
15	Vacant
16	Municipal Water Tower
17	Office
18	Residential - condominiums
19	North Shore Music Theatre
20	Commercial / Industrial
21	Office
22	Office



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Prepared For:

massDOT Massachusetts Department of Transportation Highway Division

and the

City of Beverly

Data compiled from the following source:
City of Beverly
- *Zoning: July 2012*

Approx. Scale in Feet
0 800

Route 128, Exit 19 at Brimbal Avenue
Interchange Improvements Project

ZONING MAP

Figure 4-1

4.3 Transportation Network

The transportation network in the vicinity of the project includes state and local roadways, commuter rail stations, and bus service.

Roadways

Route 128
Route 128 is a limited-access circumferential state highway that connects communities situated north, west and south of Boston. In Beverly, Route 128 is a four-lane divided highway with two lanes in each direction. Access in this area is provided at Interchange 18 at Essex Street (Route 22), Interchange 19 at Brimbal Avenue and Sohier Road, and Interchange 20 at Dodge Street (Route 1A). A service area is located on Route 128 northbound in between Interchanges 18 and 19. Interchange 19 has a partial cloverleaf design with several on and off ramps.

Sohier Road

Sohier Road is an urban minor arterial that extends in a north/south direction connecting Route 128 and downtown Beverly. Sohier Road is a two-way, two-lane roadway that begins at the Route 128 North ramps at Interchange 19 and extends southerly to Colon Street. (Direct access to Route 128 South is provided along Brimbal Avenue.) It provides access to Beverly High School, Beverly Hospital and a number of small residential neighborhoods.

Brimbal Avenue

Brimbal Avenue is an urban minor arterial that extends in a north/south direction from Dodge Street southerly to Essex Street (Route 22). The roadway is two-directional, consisting of two-lanes. Interchange 19 along Route 128 provides direct access between Route 128 South and Brimbal Avenue. (Direct access to Route 128 North is provided at Sohier Road.) Within the project area, development along Brimbal Avenue primarily consists of residential uses north of Route 128 and commercial buildings south of Route 128. The commercial property is located along the east side of Brimbal Avenue with numerous wide driveways.

Essex Street (Route 22)

Essex Street (Route 22) is a north/south state route that connects Beverly at Route 1A to Route 133 in the center of Essex. It runs through Wenham and Hamilton. The roadway is two-directional, consisting of two lanes. Route 22 provides access to Route 128 at Interchange 18, located approximately 6,200 feet east of Interchange 19. Development along Essex Street in Beverly is primarily single-family residential, however the Beverly YMCA and an assisted living facilities are also on this road.

Dunham Road

Dunham Road is a dead-end local roadway parallel to Route 128 that provides access between Brimbal Avenue and various developments including the North Shore Music Theatre (NSMT), 50 Dunham Road, Essex County Newspapers (home of The Salem News), Dunham Castle Condominiums, Maestranzi Brothers Outdoor Power Equipment, Naugler Engineering, and a residential neighborhood.

Otis Road

Otis Road is a dead-end local roadway that at one time provided access to the Beverly Sanitary Landfill. The landfill is no longer used and has been capped. Currently, Otis Road is being used as an access to contractor office space and other commercial uses that are on parcels adjacent to the landfill parcel.

Herrick Street Extension

Herrick Street Extension is a collector roadway between Cabot Street (Route 1A) on the west to Brimbal Avenue. The roadway provides access to residential development as well as medical/hospital development.

Commuter Rail / Bus Service

The North Shore is served by the Newburyport/Rockport commuter rail line. There are three commuter railroad stations (shown on Figure 1-1 in Section 1). that can be accessed by way of Exit 19 and Brimbal Avenue. Approximately 0.7 miles north of Route 128 along Brimbal Avenue, is the North Beverly Station at the intersection of Brimbal Avenue, Enon Street, and Dodge Street. South of Route 128, the Montserrat station is located less than 1 mile via Brimbal Avenue southeast of the Otis Road intersection. A little farther south is the Beverly Depot station located approximately 2 miles from the intersection of Brimbal Avenue and Otis Road. The North Beverly station provides 87 parking spaces and the Montserrat station provides 116 spaces.

MBTA bus #451 (North Beverly-Salem Depot) connects with North Beverly station via Tozer Road. Ridership is low, fewer than 300 per day. The bus runs Monday-Friday during peak hours only, with three inbound trips in the morning and four in the afternoon. In the project area there are four bus stops on Tozer Road. There is no service inbound from North Beverly after 7:10 PM. Cape Ann Transit Authority operates the City of Beverly Shuttle, a local bus providing service between Bridge Street and North Beverly. The bus runs hourly Monday-Friday, starting at 7:45 AM through 5:45 PM and runs every two hours on Saturday. No Sunday service. There is one bus stop in the project area at Herrick Street/Brimbal Avenue.

4.4 Noise

A noise analysis was completed for Phase One as discussed in Section 2.5.5. No traffic noise impacts are predicted for both residential and commercial receptors. Therefore, no noise mitigation is required for Phase 1.

Additional noise studies will be carried out for Phase Two and included in the EIR. Noise abatement may be needed along Dunham Road for Phase 2 (Full Build).

4.5 Wetlands / Vernal Pools / Floodplains

Wetland resources, vernal pools, and floodplains within the overall project area are located north and south of Route 128, as shown Figures 4-2, 4-3, and 4-4. These resources include bordering vegetated wetlands, intermittent streams, vernal pools and isolated wetlands. Norwood Pond is located north of the project limits. Selected wetland resource areas within the Phase 1 project area were field evaluated.

South of Route 128, areas of isolated wetlands are adjacent to both sides of the existing Otis Road and at the toe of slope of the landfill. A small area of Bordering Vegetated Wetland (BVW) is located west of Brimbal Avenue. This area is within the state roadway layout and receives drainage from Route 128.

North of Route 128 there is an extensive wetland system that includes certified vernal pools, potential vernal pools, bordering vegetated wetlands, intermittent streams, Norwood Pond and associated upland forested habitat.

Certified and potential vernal pools within the project vicinity are shown on Figure 4-3. On the west side of Otis Road and behind the Route 128 service area there is an isolated wetland that includes an area identified as a potential vernal pool on the NHESP datalayer. The Phase 1 project does not impact this wetland. Additional information regarding the potential for vernal pool habitat, both north and south of Route 128, will be obtained for the Draft EIR.

Floodplain areas within the project area were identified. The 100-year floodplain is the area within the level of inundation of the 100-year storm. A 100-year storm is defined as an event which has a 1% chance of occurring in any given year. No 100 year floodplain zones were identified within the project area as shown in Figure 4-4. West of Sohier Road is a small area identified as in the 500 year floodplain.

Legend:

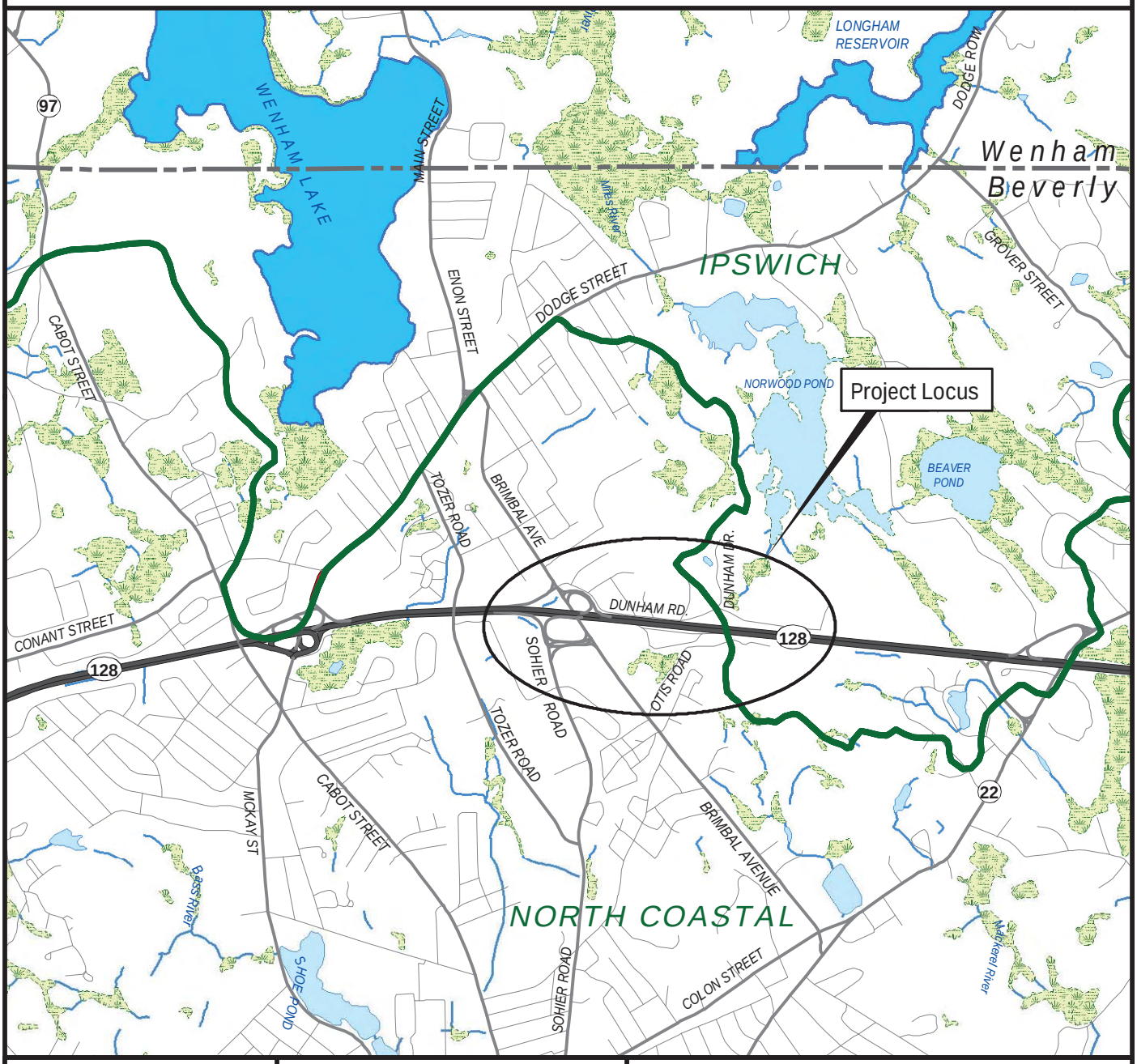
Hydrographic Features

- Wetlands
- Open Water
- Reservoir

Hydrographic Linear Features

- Shoreline
- Hydrologic Connection
- Wetland Limit

- Major Drainage Basins



J:\2006 Projects\060013.266\GIS\EENF_Fig_4-2_Wetlands.mxd

Prepared For:

massDOT Massachusetts Department of Transportation Highway Division

and the

City of Beverly

Data compiled from the following source: MassGIS, Commonwealth of Mass., Info. Technology Division
- *Major Drainage Basins: March 2003*
- *DEP Wetlands (1:12,000): Dec. 2006*
- *Hydrography (1:25,000): February 2005*

Approx. Scale in Feet

0 2,000

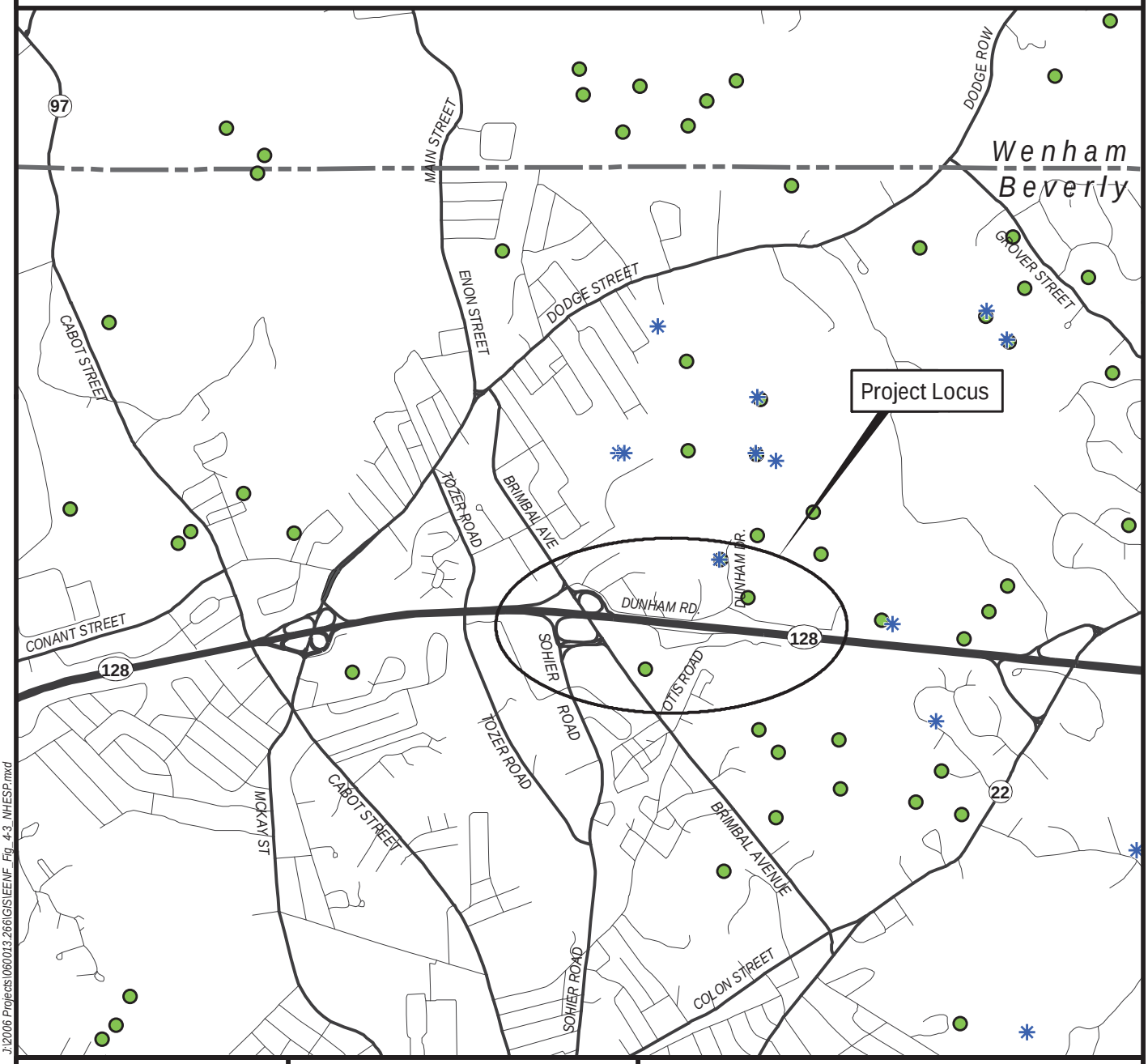
Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

WETLAND RESOURCES MAP

Figure 4-2

Legend:

- NHESP Certified Vernal Pools
- NHESP Potential Vernal Pools



J:\2006 Projects\060013.266\GIS\EENF_Fig_4-3_NHESP.mxd

Prepared For:

massDOT Massachusetts Department of Transportation Highway Division

and the

City of Beverly

Data compiled from the following source: MassGIS, Commonwealth of Mass., Info. Technology Division
- *NHESP Certified Vernal Pools: April 2013*
- *NHESP Potential Vernal Pools: December 2000*

Approx. Scale in Feet

0 2,000

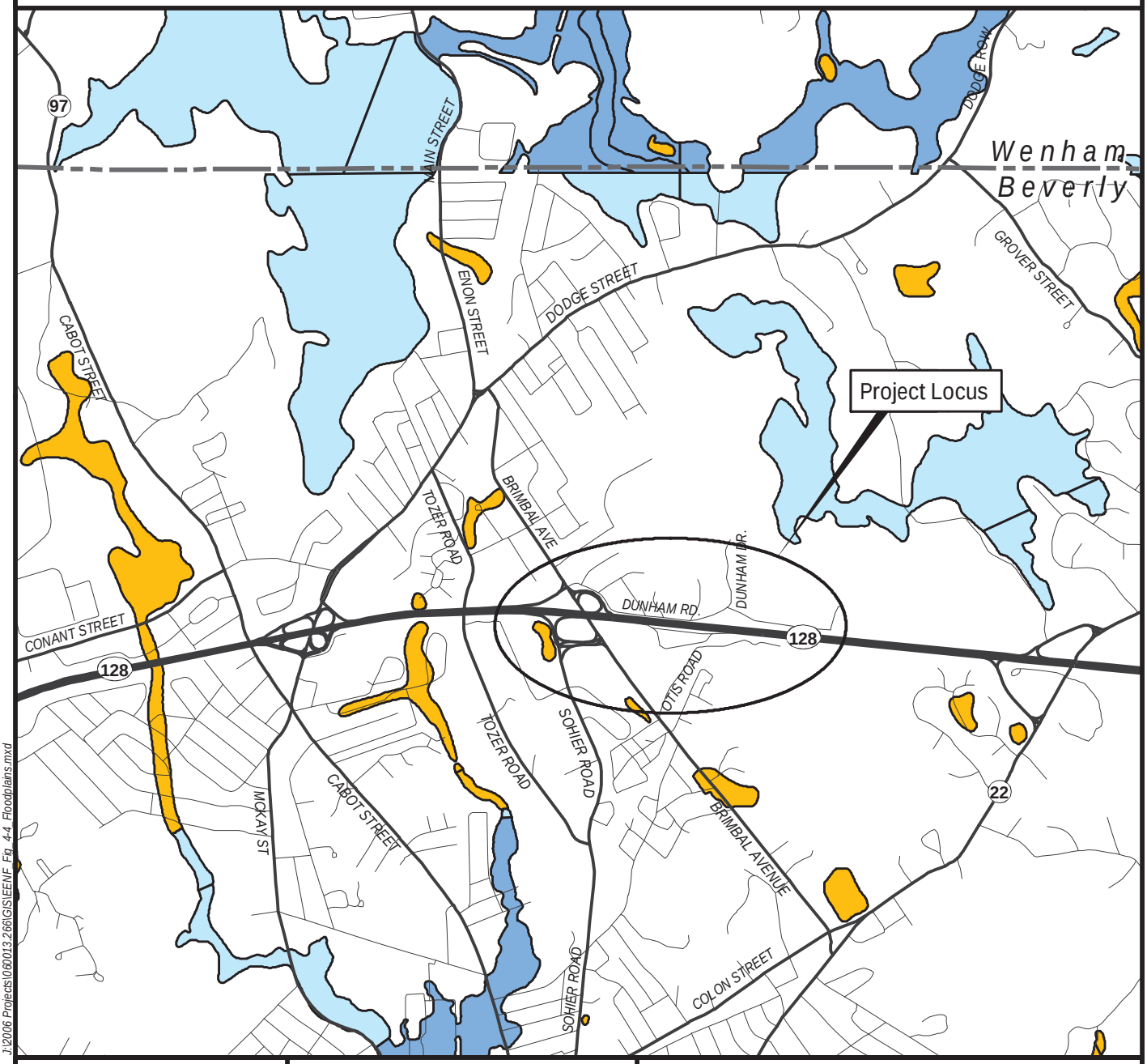
Route 128, Exit 19 at Brimbal Avenue
Interchange Improvements Project

NHESP
Certified and Potential Vernal Pools

Figure 4-3

Legend:

- Zone A - 100 Year Flood Zone
- Zone AE - 100 Year Flood Zone with a base flood elevation
- Zone X500 - 500 Year Flood Zone



J:\2006 Projects\060013.266\GIS\EENF Fig. 4-4 Floodplains.mxd

Prepared For:

massDOT Massachusetts Department of Transportation Highway Division

and the

City of Beverly

Data compiled from the following source: MassGIS, Commonwealth of Mass., Info. Technology Division

- *FEMA Q3 Flood: July 1997*

Approx. Scale in Feet

0 2,000

Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

FLOODPLAINS MAP

Figure 4-4

4.6 Watersheds / Water Supply Protection Areas

Most of the project is located within the North Coastal Watershed with a small portion of the project located within the Ipswich River Watershed. The two watersheds are shown in Figure 4-5.

The portion of the project area within the Ipswich River Watershed includes a section of the Route 128 mainline west of Exit 20, a section of Otis Road to the south of 128, and a portion of Dunham Road to the north of Route 128. Within the vicinity of the proposed project (but not within the project area) the Ipswich River Watershed includes wetlands, water supply reservoirs, intermittent streams, vernal pools, Norwood Pond, and the former City of Beverly landfill.

The portion of the project area, within \the North Coastal Watershed includes the Exit 19 ramps, a listed solid waste facility inside one of the interchange loops, a portion of the Route 128 mainline east of Exit 19, Brimbal Avenue, a portion of Otis Road, the eastern portion of Dunham Road commercial development and wetlands.

Two public water supply reservoirs within the Ipswich River Watershed are located more than one half mile north of the project area. These are Longham Reservoir and Wenham Lake which are part of the Salem-Beverly Water Supply System. Water is pumped from the Ipswich River to Putnamville Reservoir. It then flows by gravity by way of a closed conduit from the reservoir to Wenham Lake. Water is also gravity fed from Longham Reservoir to Wenham Lake via closed conduit. From Wenham Lake, water is pumped to a water treatment facility prior to distribution. None of the project area is located within the water supply protection zones for either reservoir.

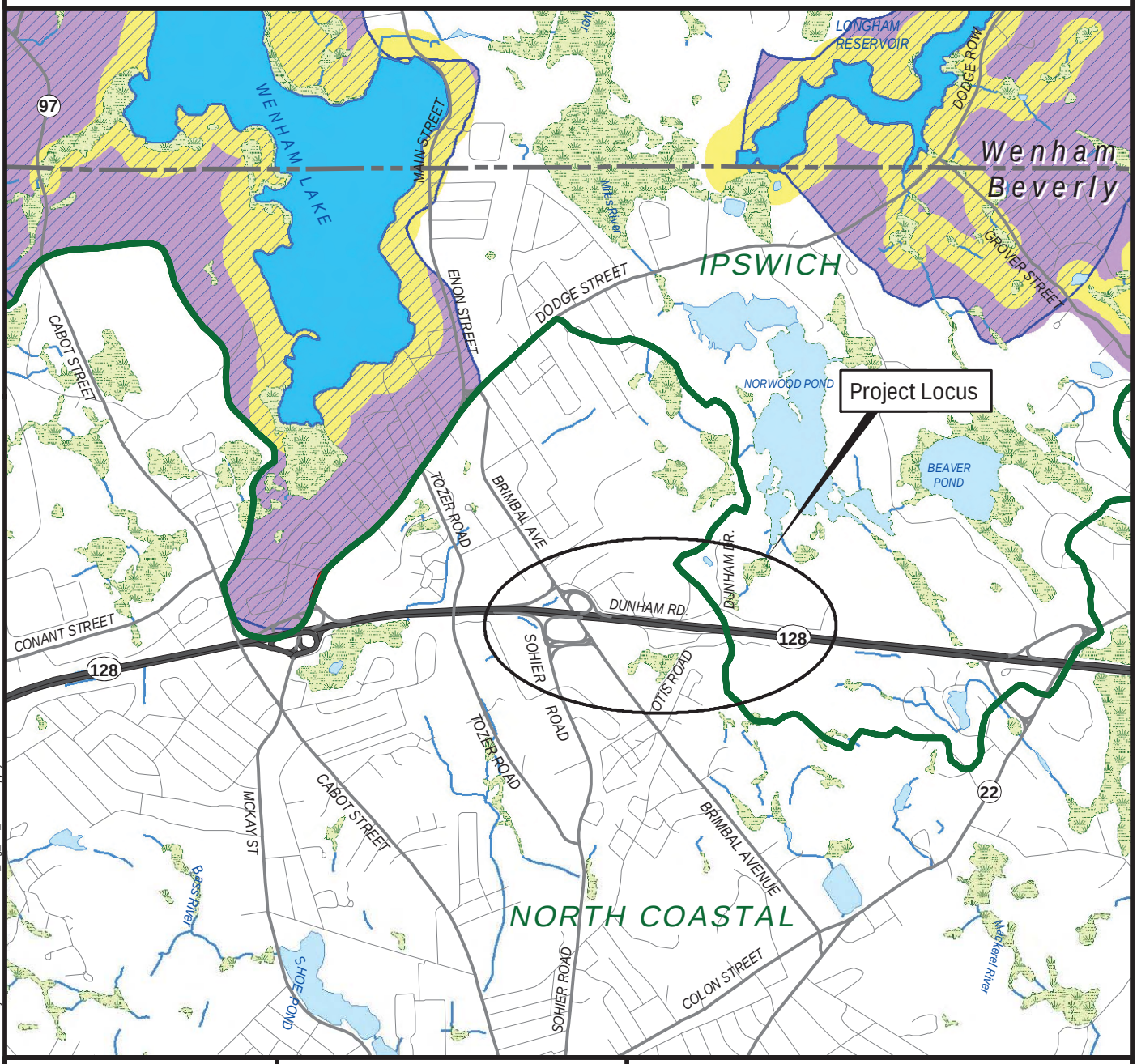
Legend:

Hydrographic Features
- Wetlands
- Open Water
- Reservoir

Hydrographic Linear Features
- Shoreline
- Hydrologic Connection
- Wetland Limit

Surface Water Protection Areas
- ZONE A
- ZONE B
- ZONE C

- Major Drainage Basins



J:\2006 Projects\060013.266\GIS\EENF_Fig_4-5_WaterSupply.mxd

Prepared For:

massDOT Massachusetts Department of Transportation Highway Division

and the

City of Beverly

Data compiled from the following source: MassGIS, Commonwealth of Mass., Info. Technology Division
- *Hydrography (1:25,000): February 2005*
- *Major Drainage Basins: March 2003*
- *Surface Water Supply Protection Areas (ZONE A, B, C): June 2006*
- *DEP Wetlands (1:12,000): Dec. 2006*

Approx. Scale in Feet

0 2,000

Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

WATERSHEDS and WATER SUPPLY PROTECTION AREAS

Figure 4-5

4.7 Protected Open Space / Norwood Pond

There are several areas of open space north and south of Route 128 near the project area as shown in Figure 4-6. Some of the areas are owned by the Essex County Greenbelt Association and other areas are owned by the City of Beverly, including Norwood Pond. The Essex County Greenbelt Association owns two properties, Burnt Hills Reservation and the Alt Forest that are classified as protected open space on the MassGIS database. The Burnt Hills Reservation property is approximately 14 acres and directly adjacent to Route 128. This property does not have public access and provides wildlife habitat. The Alt Forest is approximately 62 acres with access and parking off Grover Street. Alt Forest provides opportunities for passive recreation.

The City of Beverly owns several large properties north of Route 128 that provide open space and passive or active recreation. The properties are limited by zoning to municipal open space use.

The North Beverly School site has facilities for active recreation that are maintained by the school department.

Adjacent to the North Beverly School is the City's Water tower located on City-owned land that has wooded land with some open fields. There is no public access to the land but informal access and trails are present. Development of some of this land for ball fields is mentioned in the Open Space Plan included in the City of Beverly's Master Plan document.

The largest open space area is the city-owned Norwood Pond conservation area which comprises 135 acres of land and open water. Public access to trails is located on Dodge Street (pedestrian only) and at the end of Elnew Avenue.

Legend:

Open Space: Lands

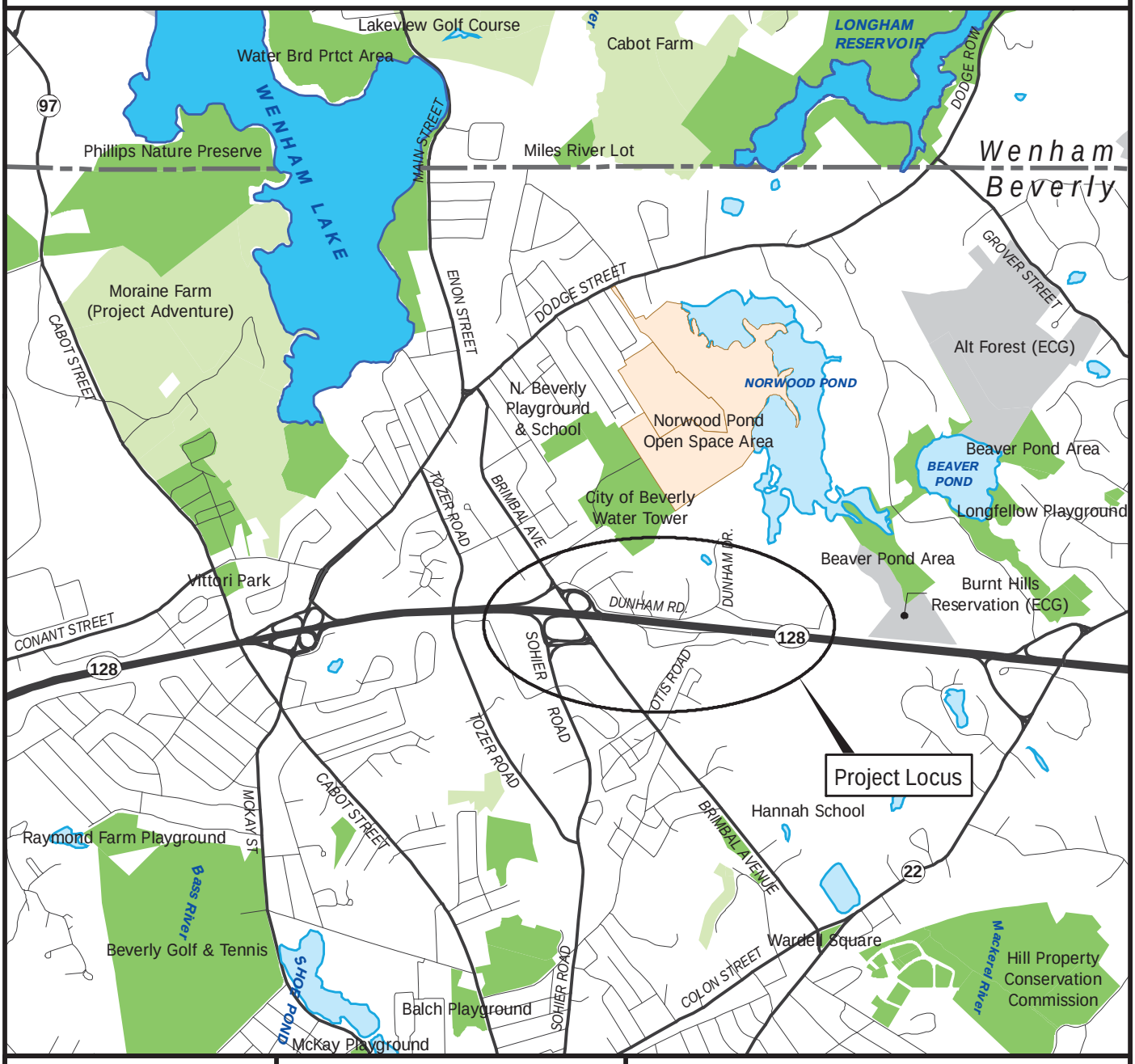
- Municipal
- Private
- Land Trust
  (ECG) - Essex County Greenbelt

Hydrographic Features

- Open Water
- Reservoir

Norwood Pond Openspace Area

- (From City of Beverly GIS)



J:\2006 Projects\060013.266\GIS\EENF_Fig_4-6_OpenSpace.mxd

Prepared For:

massDOT Massachusetts Department of Transportation Highway Division

and the

City of Beverly

Data compiled from the following source: MassGIS, Commonwealth of Mass., Info. Technology Division
- *Protected and Recreational Open Space: February 2006*

City of Beverly
- *Zoning: July 2012*

Approx. Scale in Feet
0 — 2,000

Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

PROTECTED OPEN SPACE MAP

Figure 4-6

4.8 Stormwater

Stormwater Management Standards
The Phase 1 project has been designed to comply with the 10 DEP stormwater management standards and regulations. A discussion is provided below.

Standard 1: Untreated Stormwater Discharges
No new storm water conveyances (e.g. outfalls) may discharge untreated storm water directly to or cause erosion in wetlands or waters of the Commonwealth.

Within the Phase 1 project limits, stormwater is currently untreated prior to discharge. The project proposes to collect the stormwater in new deep sump catch basins and direct the stormwater into a detention-recharge basin prior to discharge to the existing outfall. Stormwater treatment will also be provided in a vegetated bio-swale with stone sediment traps.

Within the Phase 2 (Full Build) project area, existing catch basins will be replaced with deep sump catch basins with new drainage systems and interceptor swales to improve stormwater quality.

Standard 2: Peak Rate Control and Flood Prevention
Storm water management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.

Peak discharge rates will not exceed pre-development rates. Proposed vegetated bio-swales will function as energy dissipaters and provide controlled infiltration to treat the runoff and be sized to assure that runoff discharge rates at outfall will be equal to or less than the predevelopment rates.

Standard 3: Recharge to Ground Water
Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, storm water best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post- development site shall approximate the annual recharge from predevelopment conditions based on soil type. This Standard is met when the storm water management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Storm Water Handbook.

A portion of the Phase 1 project is a “redevelopment” project as it will involve constructing pavement widenings to existing Brimbal Avenue and Sohier Road. The proposed Connector Road component of this Phase 1 is defined as “new development”. Opportunity to design and construct drainage enhancements to provide water quality

improvements and provide for recharge of treated volumes will be achieved with installation of the proposed detention basin along this relocated Connector Road. The Phase 2 (Full Build) project is a "new development" project. The associated stormwater installations will address water quality and water quantity in addition to promoting groundwater recharge to meet the required recharged volumes of treated runoff in accordance with the MassDEP Standard 3 regulatory requirement.

Standard 4: 80% TSS Removal

Storm water management systems shall be designed to remove 80% of the average annual post construction load of Total Suspended Solids (TSS). This standard is met when: a) Suitable practices for source control and pollution prevention are identified in a long term pollution prevention plan, and thereafter are implemented and maintained; b) Structural storm water best management practices are sized to capture the required water quality volume as determined in accordance with the Massachusetts Storm Water Handbook; and c) Pretreatment is provided in accordance with the Massachusetts Storm Water Handbook.

In Phase 1, existing runoff will be collected in deep sump catch basins and directed into a detention-retention basin and/or vegetated, water quality bio-swale. The Phase 2 project area runoff will be collected by deep sump catch basins and directed into improved roadside bio-swales with integral check dams installed along these swale flow paths within the limits of the interchange. Through this approach, total suspended solids will be intercepted within the captured water quality volume. Water quality improvements in compliance with MassDEP Standard 4 shall be provided.

Standard 5: Higher Potential Pollutant Loads (HPPL)

For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Storm Water Handbook to eliminate or reduce the discharge of storm water runoff from such land uses to the maximum extent practicable. If, through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt and storm water runoff, the proponent shall use the specific structural storm water BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Storm Water Handbook. Storm water discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L.c.21, §§ 26-53 and the regulations promulgated there under at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Since roadway surfaces do not constitute areas with higher potential pollutant loads under the DEP Storm Water Management Policy, there are no additional provisions required to directly meet this standard.

Standard 6: Critical Area

Storm water discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and storm water discharges near or to any other critical area require

the use of the specific source control and pollution prevention measures and the specific structural storm water best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1. or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Storm water discharges to a Zone I or Zone A are prohibited unless essential to the operation of the public water supply.

The project site is not within a known Zone II or interim Wellhead protection area. However, the project is located in proximity to wetland resources with certified or potential vernal pools. The project proposes to collect the stormwater in new deep sump catch basins and discharge treated volumes of runoff at the downstream outfalls without introducing detrimental impacts. The stormwater will also be routed through improved vegetated bio-swales with new check dam sediment traps prior to discharge to control conveyance of sediments and reduce the potential for downstream erosion.

Standard 7: Redevelopment Project Requirement

A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing storm water discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Storm Water Management Standards and improve existing conditions.

Phase 1 of this project by definition is a "redevelopment" project as it will involve constructing minor pavement widenings to existing Brimbal Avenue and Sohier Road to address future traffic and correct substandard geometry. The proposed Connector Road component of this phase 1 is defined as "new development". The project areas that fall into the redevelopment category shall be designed to meet the requirements of Standard 7.

Standard 8: Erosion and Sediment Control

A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

The design and project contract documents (plans and specifications) shall include all applicable requirements for installation of acceptable temporary and permanent erosion control elements (compost filter tubes, silt fence, turbidity curtains, vegetated swales,

check dams etc.) appropriate to the project. In addition, the Contractor will be required to develop a detailed Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan prior to commencement of construction.

Standard 9: Operation and Maintenance
A Long -Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that storm water management systems function as designed.

MassDOT Highway Division has an NPDES Stormwater Management Plan for MassDOT Owned and Operated Highways (revised January 11, 2008).

Standard 10: Illicit Discharge
All illicit discharges to the stormwater management system are prohibited.

Illicit stormwater discharges into the roadway drainage system are and will be prohibited. A signed certification statement attesting to this fact will be provided within the appendix of the project stormwater management report.

4.9 Solid Waste and Hazardous Materials

As shown on Figure 4-7, several sites within the project area are listed on various DEP databases.

Legend:

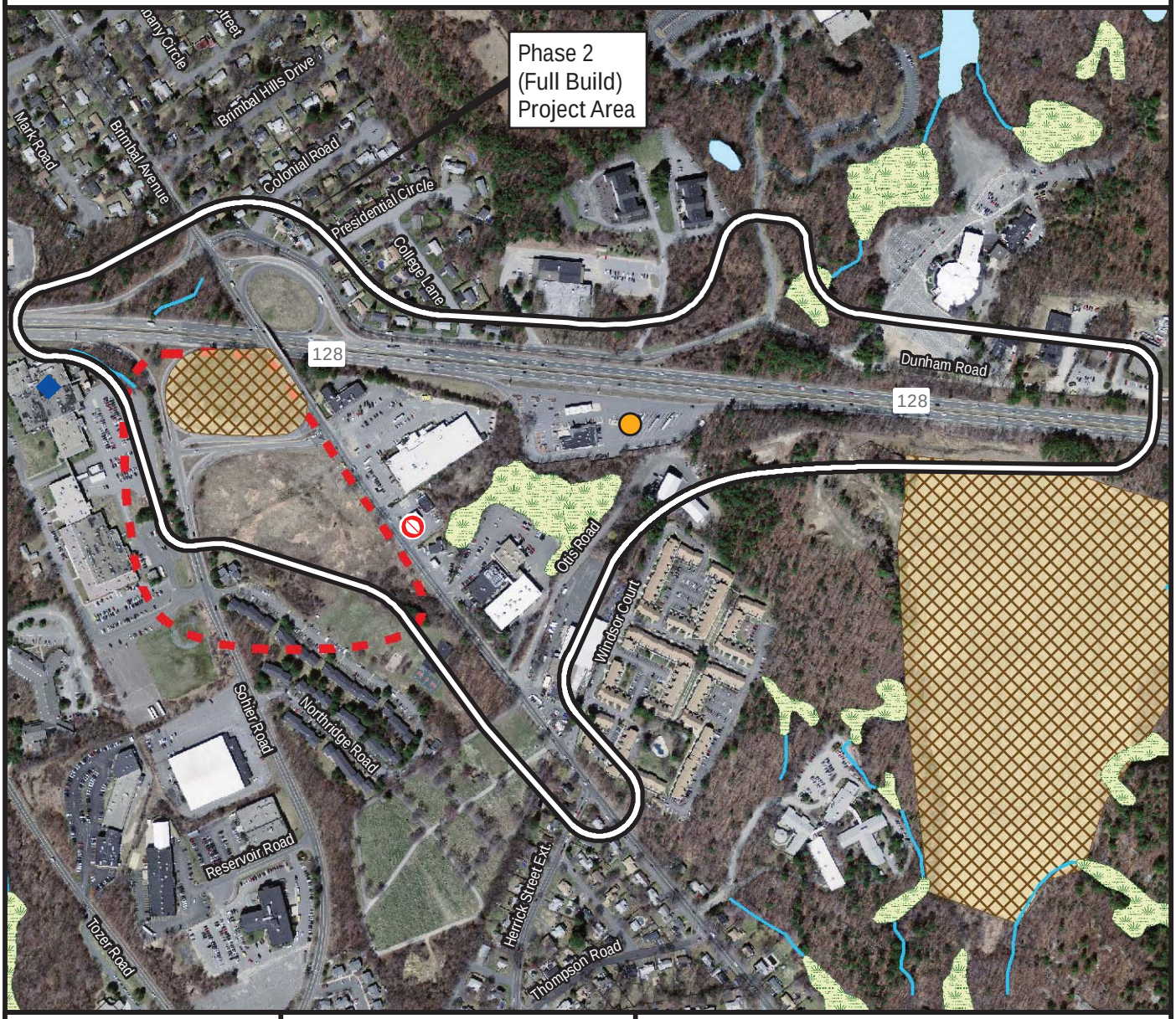
Hydrographic Features

- Wetlands
- Open Water
- Reservoir

Hydrographic Linear Features

- Shoreline
- Hydrologic Connection
- Wetland Limit

- Activity and Use Limitation (AUL) Site (located on parcel on Brimbal Ave., outside of limit of work)
- Tier Classified Site (1C)
- Response Action Outcome Site (RAO - via MassDEP Website)
- Solid Waste Facilities (Closed/Inactive)
- Historic Limits of City Landfill (Digitized from the following report: ASTM Phase I Environmental Site Assessment, Dated September 14, 2007, Prepared by: LFR, Inc.)



J12006 Projects\060013.266\GIS\EENF_Fig_4-7_Solid Waste.mxd

Prepared For:

massDOT Massachusetts Department of Transportation Highway Division

and the

City of Beverly

Data compiled from the following source: MassGIS, Commonwealth of Mass., Info. Technology Division

- *DEP Wetlands (1:12,000): Dec. 2006*
- *Hydrography (1:25,000): February 2005*
- *Oil and/or Haz. Mat. Sites (AUL): January 2013*
- *Tier Classified Sites (21E): January 2013*
- *Land Disposal of Solid Waste: December 2011*

Approx. Scale in Feet

0 600

Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

SOLID WASTE AND HAZARDOUS MATERIALS INFORMATION

Figure 4-7

Environmental investigations of soil and groundwater would be completed during design of Phase 1 and during the preparation of the Draft EIR to better characterize potential impacts.

Where required, the removing and disposing of contaminated soil, pumping of contaminated groundwater, or working in contaminated media will be done under the provisions of MGL c.21E/21C and OSHA.

During construction, measures will be undertaken to minimize and/or mitigate the health risks associated with contaminants which may be encountered during construction, such as minimizing the footprint of construction activities, treating and/or removing contaminant areas, and/or performing a Risk Characterization in accordance with the Massachusetts Contingency Plan.

5. PERMITTING

5.1 Phase 1 Project

5.1.1 Phase 1 MEPA

An Expanded Environmental Notification Form (EENF) was prepared to support a request for a Phase 1 Waiver.

5.1.2 Phase 1 Wetlands Protection Act/Beverly Wetland Ordinance

A Request for Determination of Applicability (RDA) will be submitted to the Beverly Conservation Commission for Phase 1 work within the Buffer Zone pursuant to the Wetlands Protection Act and the Beverly Wetland Ordinance since the applicant for the Phase 1 project will be the City.

5.1.3 Phase 1 NPDES Permit

The NPDES Storm Water Program requires construction projects that disturb more than 1 acre of land to obtain authorization to discharge stormwater under an NPDES construction stormwater permit. Measures to prevent erosion and sedimentation during construction are included in the application. This program is administered jointly by EPA and DEP.

The selected contractor for Phase 1 will be required to file an NPDES Notice of Intent and prepare a Stormwater Pollution Prevention Plan.

5.2 Phase 2 (Full Build) Project

5.2.1 Phase 2 MEPA

A Draft Environmental Impact Report (EIR) will be prepared in response to the Secretary's Certificate on the EENF. The Draft EIR will identify a Preferred Alternative for Phase 2 (Full Build) and all potential impacts. The Phase 1 project will also be included in the Draft EIR to avoid segmentation.

A Final EIR will then be prepared in response to the Secretary's Certificate on the draft EIR.

5.2.2 Phase 2 Wetlands Protection Act

The Phase 2 (Full Build) project will be a MassDOT project and subject to review by the Beverly Conservation Commission under the Massachusetts Wetlands Protection Act. Phase 2 is anticipated to have wetland impacts to Bordering Vegetated Wetlands (BVW)

and Isolated Vegetated Wetlands, and the regulated Buffer Zone. A Notice of Intent filing for the project will be submitted pursuant to the State regulations. Since the project is anticipated to result in alteration of less than 5,000 SF of BVW, the Beverly Conservation Commission would be authorized to issue an Order of Conditions after review of impacts and proposed mitigation.

5.2.3 Phase 2 NPDES Permit

The NPDES Storm Water Program requires construction projects that disturb more than 1 acre of land to obtain authorization to discharge stormwater under an NPDES construction stormwater permit. Measures to prevent erosion and sedimentation during construction are included in the application. This program is administered jointly by EPA and DEP.

The selected contractor for Phase 2 will be required to file an NPDES Notice of Intent and prepare a Stormwater Pollution Prevention Plan.

5.2.4 Phase 2 DEP Section 401 Water Quality Certificate

Pursuant to the federal Clean Water Act, any project that would impact wetlands requiring a federal permit requires a Water Quality Certificate to ensure that the project is in compliance with state water quality standards and regulations. The Water Quality Certificate is issued by DEP.

If the Phase 2 (Full Build) project requires a Section 404 Army Corp General Permit, the project would also require a Water Quality Certificate. The type of Certification would be identified in the Draft EIR.

5.2.5 Phase 2 Section 404 Army Corps General Permit / NEPA EA

The New England District of the U.S. Army Corps of Engineers (ACOE) has issued a General Permit (GP) for review of projects within Massachusetts with wetland impacts that are regulated under Section 404 of the Clean Water Act.

Projects must meet the criteria in one of three Categories. Depending on the impacts associated with the Phase 2 project, if a Section 404 review is required, it is likely that the project would qualify for a Category 1 or 2 GP.

6. AGENCY COORDINATION AND PUBLIC PARTICIPATION

6.1 Agency Coordination

Several meetings were held with state and regional agencies in the last year. Significant time was spent coordinating with agencies during the preparation of the MassWorks grant application for Phase 1.

- **Executive Office of Housing and Economic Development.** Meeting focused on project review and Phase 1 project (April 17, 2012).
- **Massachusetts Department of Transportation Highway Division.** Meeting was a multi-disciplinary overview of the project; land acquisition options; and environmental review requirements for Phase 1 and Phase 2 (Full Build) (January 18, 2013).
- **Massachusetts Department of Transportation Office of Transportation Planning.** Meetings focused on defining Phase 1 improvements and MassWorks program requirements (April 26, 2012; June 19, 2012; July 16, 2012; and August 9, 2012).
- **Metropolitan Area Planning Council** (MAPC). Meeting provided an overview of the project and an update on MAPC's planning initiatives in the project area and region (April 12, 2013).
- **Massachusetts Environmental Policy Act Unit** (MEPA). The meeting held August 20, 2012, provided an overview of the two phases and reviewed the MEPA filing requirements. The meeting on April 17, 2013, provided an update on Phase 2 Full Build alternatives and the proposed schedule.

6.2 Public Participation

- **Beverly Economic and Community Development Council (ECDC).** Mayor Scanlon has provided regular briefings on the project to the Council at its regular meetings on June 6, 2012; September 12, 2012; March 13, 2013; and April 11, 2013.

7. DISTRIBUTION LIST

The EENF has been sent to the following agencies, organizations, elected officials, and other interested parties.

Federal
Army Corps of Engineers, New England Division
Environmental Protection Agency, Region 1

State
Executive Office of Energy and Environmental Affairs, MEPA Office
Massachusetts Historical Commission
MassHighway, Public/Private Development Unit
MassHighway, District 4
MA DEP Commissioner's Office
DEP Division of Air Quality
DEP, Northeast Regional Office (NERO), MEPA Review Coordinator
DEP, NERO, Wetlands and Waterways
DEP, NERO, Solid Waste
Natural Heritage & Endangered Species Program
Division of Energy Resources
Energy Facilities Siting Board
MA CZM
Division of Marine Fisheries

Regional
Metropolitan Area Planning Council
North Shore Task Force

City of Beverly
Honorable William F. Scanlon, Jr., Mayor
City Council
Department of Engineering
Department of Planning
Department of Public Services
Conservation Commission
Historic District Commission
Planning Board
Public Library
Health Department
Open Space and Recreation Committee

ATTACHMENTS

1. Traffic Summary, Jacobs, May 2013
2. Phase 1 Greenhouse Gas Emissions Worksheets, May 2013
3. Correspondence with Massachusetts Historical Commission, September 10, 2012
4. Phase 1 Project Plans, May 2013

1. Traffic Summary, Jacobs, May 2013

The Traffic Summary is based on the Functional Design Report prepared by Jacobs, May 2013.

Rte 128 Exit 19 Interchange Improvements Project

TRAFFIC SUMMARY

May 2013

Project Overview

The Project would be completed in two phases. Phase 1 includes roadway improvements to Brimbal Avenue, Sohier Road, and the Connector Road south of the Route 128 Interchange. The intersection of Herrick Street Extension and Brimbal Avenue would be signalized.

The Project would be completed in two phases. Phase 2 (Full Build) would modify the existing interchange by removing SB On/Off ramps on Brimbal Ave, and construct a new diamond interchange bridge by extending Otis Road as part of an expanded interchange. Phase 2 (Full Build) includes the existing interchange ramp system, Route 128, Brimbal Avenue, Sohier Road, Dunham Road, and Otis Road. A detailed traffic study of Phase 2 improvements will be undertaken as part of the Draft Environmental Impact Statement in accordance with MEPA/MassDOT guidelines.

Existing Traffic Conditions

The freeway sections of Route 128 operate with adequate traffic operations (LOS D or better) within the study area. The interchange ramp junctions on Route 128 at Exit 19 (Brimbal Ave/Sohier Rd) and 18 (Essex St) operate with adequate traffic operations (LOS D or better). However, most of the ramp junctions are inadequate from a geometric standpoint. The weave section on Route 128 between the NB on ramp and off ramp to the service area in the study area currently operates with adequate levels of service for both the AM and PM peak hour. The following intersections were examined under weekday AM and PM peak hour conditions:

1. Sohier Rd at Connector Rd
2. Brimbal Ave at Connector Rd
3. Brimbal Ave at Rte 128 SB Ramps
4. Brimbal Ave at Dunham Rd
5. Brimbal Ave at Otis Rd
6. Brimbal Ave at Herrick St
7. Sohier Rd at Tozer Rd

Most of the intersections studied currently have operational deficiencies due to inefficient traffic control and/or insufficient lane capacity. The intersections that currently have adequate traffic operations are Brimbal Avenue at Dunham Road and at Otis Road. The Proposed Project as presented in the EENF will help remediate the inadequate intersections with improved road geometrics, efficient traffic control, and enhanced safety conditions.

Safety Analysis

Crash data from 2007 to 2009 was obtained from the Massachusetts Department of Transportation (MassDOT). The crash analysis focused on six (6) roadways: Route 128; Brimbal Ave; Sohier Rd; Dunham Rd; Herrick St; and Otis St. Additionally, the crash analysis focused on collisions that occurred at seven (7) intersections: Sohier Rd at Connector Rd; Brimbal Ave at Connector Rd; Brimbal Ave at Route 128 Southbound (SB) ramps; Brimbal Ave at Dunham Rd; Brimbal Ave at Otis Rd; Brimbal Ave at Herrick St; and Sohier Rd at Tozer Rd. Within the study area, five (5) locations have crash rates that exceed Massachusetts State averages. However, the Proposed Project as presented in the EENF will help remediate these locations with improved road geometrics, efficient traffic control, and enhanced safety conditions.

Concept Analysis

For Phase 2 (Full Build), the FDR examined the feasibility of No-Build and three Build Concepts (with one Concept having two design options).

- No-Build
- Concept 1: Reconstruct the Existing Interchange (*Reconstruct Existing*)
- Concept 2: Reconstruct the Existing Interchange with a New Overpass (*Overpass*)
- Concept 3 (Option A): Expand the Interchange with a Single Point Urban Interchange (*SPUI*)
- Concept 3: Expand the Interchange with a Diamond Interchange (*Preferred Concept*)
  - Option B –Diamond Interchange with Signals
  - Option C –Diamond with Roundabouts
- Concept 3 (Option D): Expand the Interchange with a Modified Diamond (*Modified Diamond*).

The Phase 2 (Full Build) Preferred Concept interchange design was Concept 3 (Option B) as it provides for the necessary capacity and mobility to adequately facilitate the movement of traffic while supporting the travel demands of Design Year 2035 from a regional and local scale.

Potential Developments and Projects

Future land use analyzed in this study is based on information provided by the City of Beverly. ITE's *Trip Generation 8th Edition* was used to estimate peak hour development trips from these new uses. It should be noted that per the *Brimbal Avenue Build-out Alternatives Study (MAPC, 2011)*, the transit, walk, carpool share of the trip generation was assumed to be 9%. Sixty-five percent (65%) of the trips to and from the area were assumed to come via Route 128, split 65-35 from the north and south, respectively. The other 35% were assumed to come to/from the area via local streets. Developments 1-3

and 22-23 were assumed for Phase 1 Year 2017 Build conditions. They are shaded in grey in the Trip Generation Table.

Trip Generation Table

Land Use (Development # - ITE Code - Owner)	Added Square Footage	Added Employees	AM Peak Hour			PM Peak Hour			Weekend
			Auto	Alt. Modes	Total	Auto	Alt. Modes	Total	
*Development 1 - ITE 710 - Comm. & Power Ind.	50,986	600	262	26	288	251	25	276	324
*Development 2 - ITE 820 - Brimbal Ave. Dev. Corp.	90,000	250	82	8	90	305	30	336	4,497
*Development 3 - ITE 710 - Cell Signaling	93,650	300	131	13	144	126	12	138	162
Development 4 - ITE 150 - Drislane	3,500	295	137	14	150	158	16	174	295
Development 5 - ITE 710 - Santin	23,229	125	55	5	60	52	5	58	68
Development 6 - ITE 110 - Devens	50,000	150	60	6	66	57	6	63	72
Development 7 - ITE 495 - Bojem Realty Trust	5,880	145	351	35	386	322	32	354	2,659
Development 8 - ITE 710 - Sun Refinancing	-2,500	95	41	4	46	40	4	44	51
Development 10 - ITE 710 - Santin	0	125	55	5	60	52	5	58	68
Development 13 - ITE 710 - City of Beverly	100,000	300	131	13	144	126	12	138	162
Development 15 - ITE 110 - Maestranzi	150,000	450	180	18	198	172	17	189	216
Development 16 - ITE 230 - YMCA	250	n/a	100	10	110	118	12	130	1,418
Development 17 - ITE 110 - Maestranzi	150,000	450	180	18	198	172	17	189	216
Development 19 - ITE 710/310/110 - Cummings	686,652	1,983	968	96	1,064	1,011	100	1,110	8,785
Development 20 - ITE 110 - Live North Vent.	210,994	675	270	27	297	258	26	284	324
Development 21 - ITE 110 - Maestranzi	190,000	595	238	24	262	227	22	250	286
*Development 22 - ITE 610 - Northeast Hospital	1,348	500	150	15	165	150	15	165	1,890
*Development 23 - ITE 610 - Northeast Hospital	106,300	300	90	9	99	90	9	99	1,134

*Phase 1 Development

No-Build Traffic Conditions for Freeway, Ramps and Weave (Year 2035)

The freeway sections of Route 128 are forecasted to operate with adequate traffic operations (LOS D or better) within the study area. The interchange ramp junctions on Route 128 at Exit 19 and 18 are forecasted to operate with adequate traffic operations (LOS D or better). The weave section in the study area is forecasted to operate with adequate levels of service for both the AM and PM peak hour.

Since Year 2035 No-Build analysis indicate adequate LOS during the weekday AM and PM peak hour for the freeway, ramp and weave sections, the Year 2017 No-Build will also be expected to have adequate LOS during the weekday AM and PM peak hour.

Along with the Proposed Project, under Full Build Year 2035 conditions, an improvement should be considered to support the design traffic for a particular merge junction on Route 128. This merge junction is created from the Brimbal on ramp from north of Route 128 merging with SB Route 128 traffic. The acceleration lane should be extended by approximately 200 feet at least to improve PM peak hour operations in 2035 from LOS E to LOS D.

No-Build Traffic Conditions for Intersections (Year 2017 and Year 2035)

The same intersections with inadequate traffic conditions under the existing traffic conditions summary are expected to worsen in the future without any roadway or intersection control improvements. However, the Proposed Project as presented in the EENF will help remediate the inadequate intersections with improved road geometrics, efficient traffic control, and enhanced safety conditions.

Preferred Concept Phase 1 Intersection Analysis

Intersection peak hour traffic operations were analyzed for the Phase 1 Build (Year 2017). Two Options (A and B) are analyzed. In both cases, Connector Road is relocated further to the south to allow for more storage capacity and prevent spillback potential to Route 128. The primary difference between Option A and B is the form of traffic control for the intersections with Connector Road at both Sohier Road and Brimbal Avenue. The study intersections and proposed improvements are as follows.

<u>Phase 1 Build Intersections (Option A)</u>

1. Sohier Road at Connector Road (Signal, lane additions)
2. Brimbal Avenue at Connector Road (Signal, lane additions)
3. Brimbal Avenue at Route 128 SB Ramps (Re-striping)
4. Brimbal Avenue at Dunham Road (Stop Control)
5. Brimbal Avenue at Otis Road (No improvements)
6. Brimbal Avenue at Herrick Street (Signal and re-striping)
7. Sohier Road at Tozer Road (No improvements)
8. Connector Road at Development #2 Driveway (Roundabout)

<u>Phase 1 Build Intersections (Option B)</u>

1. Sohier Road at Connector Road (Roundabout, lane additions)
2. Brimbal Avenue at Connector Road (Roundabout, lane additions)
3. Brimbal Avenue at Route 128 SB Ramps (Re-striping)
4. Brimbal Avenue at Dunham Road (Stop Control)
5. Brimbal Avenue at Otis Road (No improvements)

6. Brimbal Avenue at Herrick Street (Signal and re-striping)
7. Sohier Road at Tozer Road (No improvements)
8. Brimbal Avenue at Development #2 Driveway (Signal, lane additions)

Most intersections are forecast to operate with adequate weekday AM and PM peak hour traffic operations under Phase 1 Year 2017 Build conditions, for either Option A and Option B. Under both Options, the intersection of Sohier Road and Tozer Road is expected to have poor operations, but can be remediated with lane striping on the Tozer Road approach to provide left turn lane and right turn lane. Under both Options, the intersection of Rte 128 SB off ramps and Brimbal Avenue is expected to have poor operations, but queues are not expected to spillback onto Route 128 SB.

With Phase 1 Build improvements, study intersections will have a reduction in vehicular delay by over 10%, queues lengths on currently uncontrolled approaches with new traffic signalization will be reduced by over 15%, and safety at the intersections will be enhanced through more efficient traffic control and lane geometry improvements.

MUTCD Traffic Signal Warrants

A traffic signal warrant analysis was performed for study intersections that have new traffic signals proposed for Phase 1. The analysis was executed using the Federal Highway Administration's (FHWA) Manual on Uniform Traffic Control Devices (MUTCD), 2009 Edition.

Signal warrant studies for the 3 Phase 1 subject intersections were examined for each of the eight different warrant criteria in the MUTCD. Based on the engineering study, all 3 intersections have traffic volumes that meet warrant analysis in the MUTCD based on Year 2017 traffic conditions. Warrants 1, 2, and 3 are met for all 3 intersections. Specifically meeting those three signal warrants (1-3) indicate positive support for the implementation of traffic signals at those locations and improved safety.

Preferred Concept 3 Phase 2 Intersection Analysis

Intersection peak hour traffic operations were analyzed for Phase 2 (Full Build) (Year 2035) Preferred Concept conditions. In both cases, Connector Road is relocated further to the south to allow for more storage capacity and prevent spillback potential to Route 128. The primary difference between Concept 3 Option A and B is the form of traffic control for the intersections with Connector Road at both Sohier Road and Brimbal Avenue. The study intersections and proposed improvements are as follows.

Phase 2 (Full Build) Build Intersections (Concept 3 Option A)

1. Sohier Road at Connector Road (Signal, lane additions)
2. Brimbal Avenue at Connector Road (Signal, lane additions)
3. Brimbal Avenue at Rte 128 SB On Ramp/Dunham Road (Signal, lane additions)
4. Brimbal Avenue at Otis Road (Signal, lane additions)

5. Brimbal Avenue at Herrick Street (Signal, lane additions)
6. Sohier Road at Tozer Road (Signal, lane additions)
7. Otis Road at Rte 128 NB Ramps (New Signalized Interchange)
8. Otis Road at Rte 128 SB Ramps/Dunham Rd (New Signalized Interchange)
9. Connector Road at Development #2 Driveway (Roundabout)

Phase 2 (Full Build) Build Intersections (Concept 3 Option B)

1. Sohier Road at Connector Road (Roundabout, lane additions)
2. Brimbal Avenue at Connector Road (Roundabout, lane additions)
3. Brimbal Avenue at Rte 128 SB On Ramp/Dunham Road (Signal, lane additions)
4. Brimbal Avenue at Otis Road (Signal, lane additions)
5. Brimbal Avenue at Herrick Street (Signal, lane additions)
6. Sohier Road at Tozer Road (Signal, lane additions)
7. Otis Road at Rte 128 NB Ramps (New Signalized Interchange)
8. Otis Road at Rte 128 SB Ramps/Dunham Rd (New Signalized Interchange)
9. Brimbal Avenue at Development #2 Driveway (Signal, lane additions)

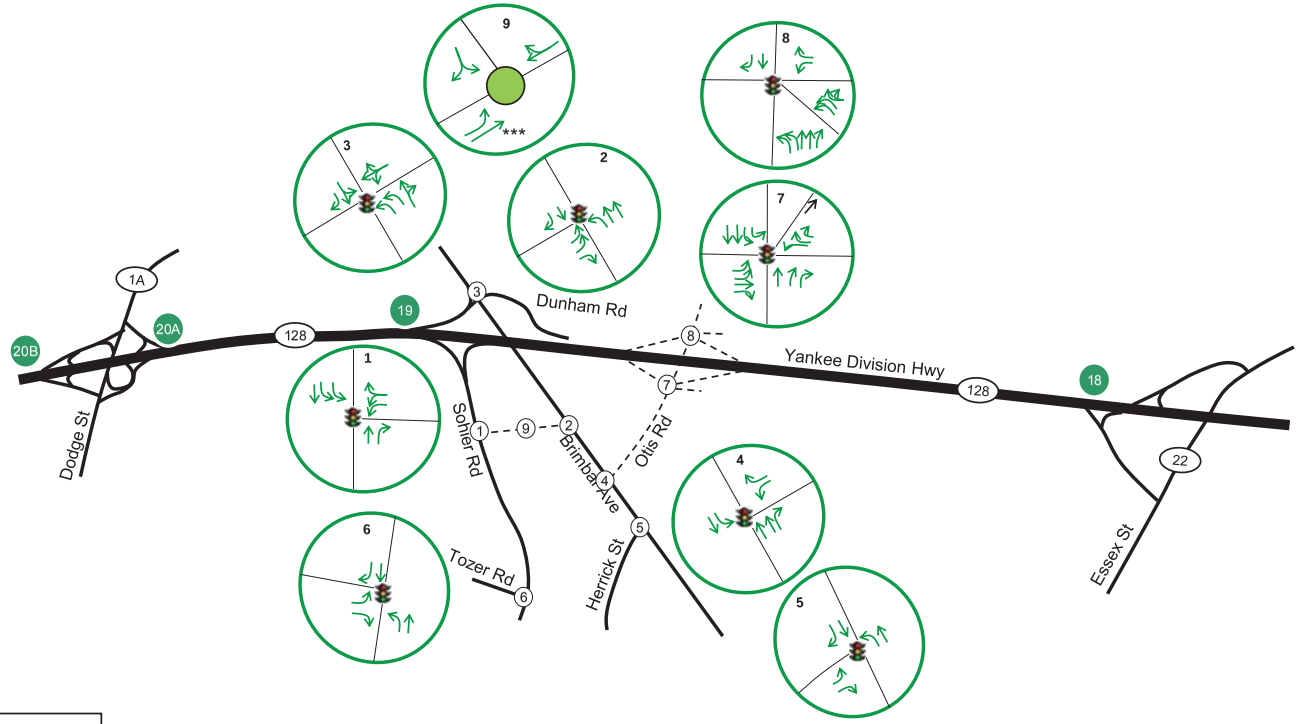
The conceptual Project under Phase 2 conditions as discussed in the EENF will be developed further in the EIR to remediate the inadequate intersections with improved road geometrics, efficient traffic control, and enhanced safety conditions. Most intersections are forecast to operate with adequate weekday AM and PM peak hour traffic operations under Phase 2 Year 2035 Build conditions, for either Option A and Option B. Under both Options, the intersection of Otis Road and Route 128 SB is expected to have poor operations during the PM peak hour. However, queues are not expected to spillback onto Route 128 SB. See Table 7-3 in the FDR.

Phase I Preferred Concept – Signals versus Roundabouts

The main difference between Option A and Option B is intersection traffic control at the intersections located along Connector Road. Under the signal alternative, new traffic signals are proposed on Connector Road at Sohier Road and Brimbal Avenue. Under the roundabout alternative, new roundabouts are proposed on Connector Road at Sohier Road and Brimbal Avenue.

Both Phase 1 alternatives offer satisfactory overall LOS and should be analyzed in further detail as part of the 25% design process.

Figures 1 and 2 show the roadway improvements, lane additions, and enhanced traffic control for the Preferred Concept (Option A). Additionally, these figures communicate adequate traffic operations during the Year 2035 Full Build weekday AM and PM peak hours, respectively.



Legend

New Roundabout

New Signal

LOS A - D

LOS E

LOS F

*** Bypass lane with receiving lane

Signalized Intersection or Roundabout ONLY–
Overall intersection LOS shown by color of circle

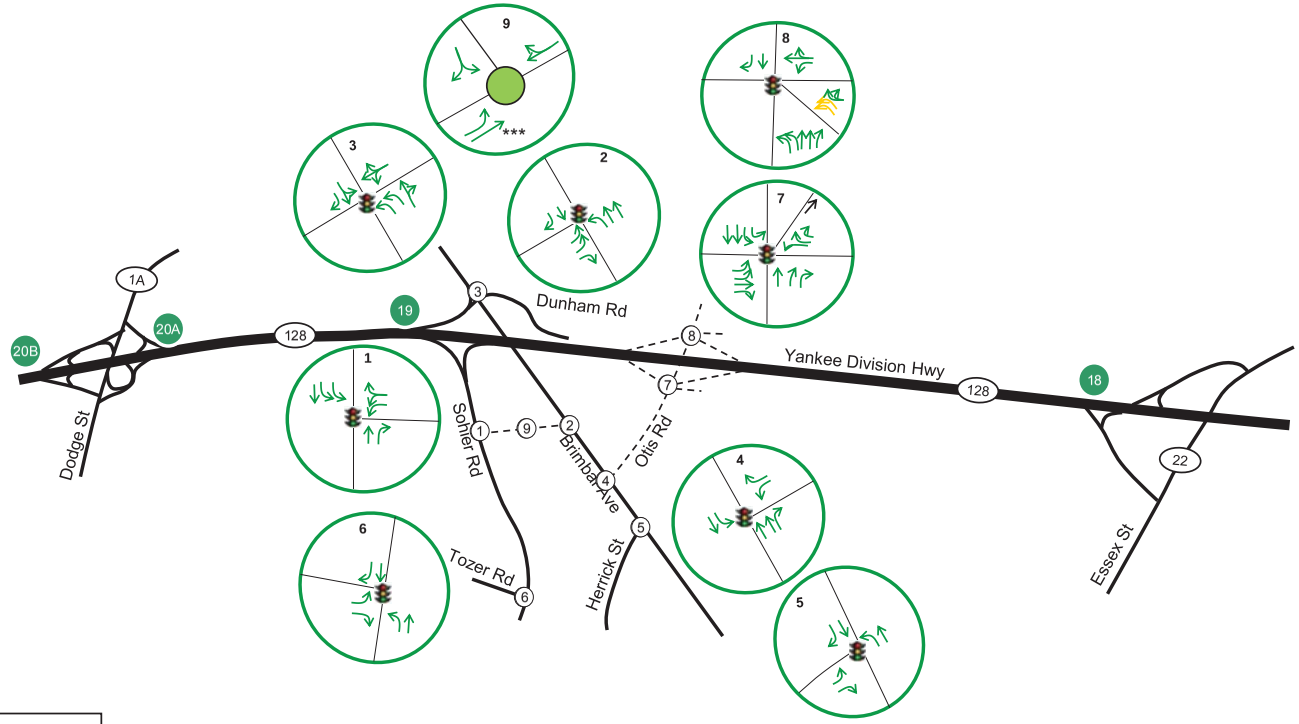
massDOT
Massachusetts Department of Transportation
Highway Division

N.T.S

Route 128, Exit 19
Interchange Improvements Project

PHASE 2 YEAR 2035 BUILD LOS AM
OPTION A - SIGNALS

Figure 1



Legend

New Roundabout

New Signal

LOS A - D

LOS E

LOS F

*** Bypass lane with receiving lane

Signalized Intersection or Roundabout ONLY–
Overall intersection LOS shown by color of circle

massDOT
Massachusetts Department of Transportation
Highway Division

N.T.S

Route 128, Exit 19
Interchange Improvements Project

PHASE 2 YEAR 2035 BUILD LOS PM
OPTION A - ROUNDABOUTS

Figure 2

2. Phase 1 Greenhouse Gas Emissions Worksheets, May 2013

Project Memorandum

343 Congress Street
Boston, MA 02210 USA
1.617.242.9222 Fax 1.617.242.9824

Date	May 29, 2013	**From**	Amos Fernandes
To	Rod Emery	**Subject**	GHG Analysis
Firm Name	Jacobs	**Project Name**	The Route 128, Exit 19 Interchange Improvements Project in Beverly, Massachusetts
Address	343 Congress St, Boston, MA	**Project No.**	
Telephone No.		**Copies to**	
Fax No.		**Total Pages**	17

Transmitted Via: ☐ Overnight Mail ☐ First Class Mail ☐ Facsimile ☐ Email ☒ Courier

The Route 128, Exit 19 Interchange Improvements Project in Beverly, Massachusetts, was analyzed for air quality in accordance with guidance provided in the *Revised MEPA Greenhouse Gas Emissions Policy and Protocol, effective May 5, 2010*. In its essence, Greenhouse Gases (GHG) trap heat in the atmosphere and can lead to global warming. The change in emissions for the subject interchange was derived using the *Congestion Mitigation and Air Quality (CMAQ) Analysis Worksheet for Traffic Flow and Intersection Improvements* provided by MassDOT Office of Planning.

Three (3) key intersections in the study area were identified as emission locations for the proposed project under Phase 1 and were examined for Year 2017 before and after (i.e. No-Build and Build) conditions.

Two Options (A and B) are analyzed. In both cases, Connector Road is relocated further to the south to allow for more storage capacity and prevent spillback potential to Route 128. The primary difference between Option A and B is the form of traffic control for the intersections with Connector Road at both Sohier Road and Brimbal Avenue. Under Option A, new traffic signals are proposed on Connector Road at Sohier Road and Brimbal Avenue. Under Option B, new roundabouts are proposed on Connector Road at Sohier Road and Brimbal Avenue.

These intersections for both Options are as follows:

- Sohier Road at Connector Road;
- Brimbal Avenue at Connector Road; and,
- Brimbal Avenue at Route 128 SB On/Off Ramps.

Emission rates from the worksheet represent the latest conditions obtained from EPA's *MOBILE 6 Air Quality Model*. Year 2017 No-Build and Build peak-hour intersection analysis results from Synchro and HCM 2010 Roundabout calculations were used in the analysis. Intersection volumes, peak hour factors, and movement delays were key inputs.

Results

Phase 1 Year 2017 conditions for the Route 128 Exit 19 Interchange Improvements Project shows net benefits in air quality compared to No-Build conditions, under both Build Options. It should be noted that Option A (Signals) shows more net benefits in air quality, relative to Option B (roundabouts).

Summary tables for both Options and back up calculations follow.

GHG Analysis for Option A - Signals on Connector Road at Sohier Rd and Brimbal Avenue

Scenario	Annual Million Entering Vehicles (MEV)[1]	Annual Congestion in Veh-Hrs	Summer CO_2 Tons per year	Net change in CO_2 (Tons per year)
2012 Existing	8.91	283,792	434	NA
2017 Future No Build with background growth[2]	9.15	355,709	544	110
2017 Future Build Phase One with background growth	9.15	36,997	57	-377
2017 Future Build Phase One with development traffic[3] added and background growth	11.475	63,147	97	-337

[1]Entering intersection volumes for Connector at Sohier, Connector at Brimbal, Brimbal at SB Off Ramp

[2]Background growth assumes 0.5% per year from regional growth in traffic

[3]Developments 1-3, 22, and 23 from the trip generation analysis presented in the EENF Traffic Study

GHG Analysis for Option B - Roundabouts on Connector Road at Sohier Rd and Brimbal Avenue

Condition	Annual Million Entering Vehicles (MEV)[1]	Annual Congestion in Veh-Hrs	Summer CO_2 Tons per year	Net change in CO_2 (Tons per year)
2012 Existing	8.91	283,792	434	NA
2017 Future No Build with background growth[2]	9.15	355,709	544	110
2017 Future Build Phase One with background growth	9.15	14,417	50	-384
2017 Future Build Phase One with development traffic[3] added and background growth	11.475	43,463	67	-367

[1]Entering intersection volumes for Connector at Sohier, Connector at Brimbal, Brimbal at SB Off Ramp

[2]Background growth assumes 0.5% per year from regional growth in traffic

[3]Developments 1-3, 22, and 23 from the trip generation analysis presented in the Traffic Study

Connector Rd at Sohier Rd - Existing

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2012

MPO:

Municipality: Beverly

Project: *Connector Rd at Sohier Rd - Existing*

Step 1: Calculate Existing AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay
Sohier Rd	NB				=		+ 97	0.92	0.0	=	0	+ 169	0.92	0.0	=	0	=	0
Sohier Rd	SB	354	0.92	10.1	=	3,886	+ 413	0.92	0.0	=	0	+			=		=	3,886
	EB				=		+			=		+			=		=	0
Connector	WB	295	0.92	298.3	=	95,651	+			=		+ 73	0.92	9.5	=	752	=	96,403
				assume PM delay												Total Intersection Delay/Seconds	=	**100,289**

Step 2: Calculate Existing PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay
Sohier Rd	NB				=		+	0.92	0.0	=	0	+	0.92	0.0	=	0	=	0
Sohier Rd	SB	413	0.92	10.4	=	4,669	+	0.92	0.0	=	0	+			=		=	4,669
	EB				=		+			=		+			=		=	0
Connector	WB	123	0.92	298.3	=	39,881	+			=		+ 154	0.92	10.5	=	1,754	=	41,635
																Total Intersection Delay/Seconds	=	**46,304**

MEV	Veh-Hrs Delay	CO2
1,401	250722542.6	96691.7712
14010	69645.15071	
3502500		
3.5025		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM): AM Total Intersection Delay: 100,289

Step 4: Calculate the existing AM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay
Sohier Rd	NB				=		+ 123	0.92	15.5	=	2,072	+ 209	0.92	6.5	=	1,477	=	3,549
Sohier Rd	SB	376	0.92	24.6	=	10,054	+ 627	0.92	10.2	=	6,952	+			=		=	17,005
	EB				=		+			=		+			=		=	0
Connector	WB	522	0.92	23.0	=	13,050	+			=		+	0.92		=	0	=	13,050
									Combined delay under LT							Total Intersection Delay/Seconds	=	**33,604**

Step 5: Calculate vehicle delay in hours per day:

	(	Delay in seconds	X	Hours per day)	/	Seconds per hour	=	Delay in hours / day
Existing peak hour intersection delay	(	100,289	X	10)	/	3600	=	278.6
Peak hour intersection delay w/ improvements	(	33,604	X	10)	/	3600	=	93.3

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	278.6	1.129	0.503	13.855	394.178
With Improvements	93.3	0.378	0.168	4.643	132.079
Net Change		**-0.751**	**-0.334**	**-9.213**	**-262.099**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
Summer VOC Emissions	-0.751	X	250	X	1.0188	=	**-191.218**
Summer NOx Emissions	-0.334	X	250	X	1.0188	=	**-85.159**
Winter CO Emissions	-9.213	X	250	X	0.9812	=	**-2,259.869**
Summer CO2 Emissions	-262.099	X	250	X	0.9812		**-64,292.771**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	-191.218	=	**$0**
Summer NOx		/	-85.159	=	**$0**
Winter CO		/	-2,259.869	=	**$0**
Summer CO2		/	-64,292.771	=	**$0**

Connector Rd at Brimbal Ave - Existing

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2012

MPO:

Municipality: Beverly

Project: *Connector Rd at Brimbal Ave - Existing*

Step 1: Calculate Existing AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Brimbal Ave	NB	76	0.92	2.2	182									182
Brimbal Ave	SB					396	0.92	0.2	86					86
Connector	EB	253	0.92	752.2	206,855					258	0.92	18.3	5,132	211,987
	WB													0
													Total Intersection Delay/Seconds	**212,255**

Step 2: Calculate Existing PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Brimbal Ave	NB	734	0.92	2.2	1,755									1,755
Brimbal Ave	SB					290	0.92	0.4	126	179	0.92	0.0	0	126
Connector	EB	322	0.92	752.2	263,270					302	0.92	19.1	6,270	269,540
	WB													0
				assume AM delay									Total Intersection Delay/Seconds	**271,421**

MEV	Veh-Hrs Delay	CO2
1,827	678552717.4	261685.541
18270	188486.8659	
4567500		
4.5675		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM): PM

Total Intersection Delay: 271,421

Step 4: Calculate the existing PM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Brimbal Ave	NB	123	0.92	19.7	2,634	730	0.92	13.7	10,871					13,504
Brimbal Ave	SB					310	0.92	17.7	5,964	197	0.92	5.4	1,156	7,120
Connector	EB	568	0.92	18.8	11,607					338	0.92	10.0	3,674	15,281
	WB													0
													Total Intersection Delay/Seconds	**35,906**

Step 5: Calculate vehicle delay in hours per day:

	(Delay in seconds	X Hours per day)	/ Seconds per hour	= Delay in hours / day
Existing peak hour intersection delay	(271,421	X 10)	/ 3600	= 753.9
Peak hour intersection delay w/ improvements	(35,906	X 10)	/ 3600	= 99.7

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	753.9	3.056	1.361	37.498	1,066.798
With Improvements	99.7	0.404	0.180	4.960	141.125
Net Change		**-2.652**	**-1.181**	**-32.537**	**-925.673**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X Avg. weekdays per year	X Seasonal adj. factor	= Adj. net change in kg per year
Summer VOC Emissions	-2.652	X 250	X 1.0188	= **-675.340**
Summer NOx Emissions	-1.181	X 250	X 1.0188	= **-300.762**
Winter CO Emissions	-32.537	X 250	X 0.9812	= **-7,981.350**
Summer CO2 Emissions	-925.673	X 250	X 0.9812	**-227,067.676**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	= First year cost per kilogram
Summer VOC		/	-675.340	= **$0**
Summer NOx		/	-300.762	= **$0**
Winter CO		/	-7,981.350	= **$0**
Summer CO2		/	-227,067.676	= **$0**

Rte 128 SB Ramps at Brimbal Ave - Existing

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2012

MPO:

Municipality: Beverly

Project: *Rte 128 SB Ramps at Brimbal Ave - Existing*

Step 1: Calculate Existing AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Brimbal Ave	NB				=	+			=	+			=	= 0
Brimbal Ave	SB				=	+			=	+			=	= 0
	EB				=	+			=	+			=	= 0
SB Ramps	WB	281	0.92	118.9	= 36,316	+			=	+	55	0.92	10.6	= 634 = 36,950

Total Intersection Delay/Seconds = **36,950**

Step 2: Calculate Existing PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Brimbal Ave	NB				=	+			=	+			=	= 0
Brimbal Ave	SB				=	+			=	+			=	= 0
	EB				=	+			=	+			=	= 0
SB Ramps	WB	136	0.92	26.2	= 3,865	+			=	+	50	0.92	11.8	= 641 = 4,506

Total Intersection Delay/Seconds = **4,506**

MEV	Veh-Hrs Delay	CO2
336	92374728.26	35624.5434
3360	25659.64674	
840000		
0.84		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM) AM

Total Intersection Delay: 36,950

Step 4: Calculate the existing AM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Brimbal Ave	NB				=	+			=	+			=	= 0
Brimbal Ave	SB				=	+			=	+			=	= 0
	EB				=	+			=	+			=	= 0
SB Ramps	WB	467	0.92	42.2	= 21,421	+			=	+			=	= 21,421

Total Intersection Delay/Seconds = **21,421**

Step 5: Calculate vehicle delay in hours per day:

	(Delay in seconds	X	Hours per day)	/	Seconds per hour	=	Delay in hours / day
Existing peak hour intersection delay	(36,950	X	10)	/	3600	=	102.6
Peak hour intersection delay w/ improvements	(21,421	X	10)	/	3600	=	59.5

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	102.6	0.416	0.185	5.105	145.228
With Improvements	59.5	0.241	0.107	2.959	84.194
Net Change		**-0.175**	**-0.078**	**-2.145**	**-61.035**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
Summer VOC Emissions	-0.175	X	250	X	1.0188	=	**-44.529**
Summer NOx Emissions	-0.078	X	250	X	1.0188	=	**-19.831**
Winter CO Emissions	-2.145	X	250	X	0.9812	=	**-526.254**
Summer CO2 Emissions	-61.035	X	250	X	0.9812		**-14,971.805**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	-44.529	=	**$0**
Summer NOx		/	-19.831	=	**$0**
Winter CO		/	-526.254	=	**$0**
Summer CO2		/	-14,971.805	=	**$0**

Rte 128 SB Ramps at Brimbal Ave - No-Build

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2017

MPO:

Municipality: Beverly

Project: *Rte 128 SB Ramps at Brimbal Ave - No-Build*

Step 1: Calculate No build vols with background growth AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Brimbal Ave	NB				=				=				=	= 0
Brimbal Ave	SB				=				=				=	= 0
	EB				=				=				=	= 0
SB Ramps	WB	288	0.92	141.8	= 44,390				=	56	0.92	10.7	= 651	= 45,041
													Total Intersection Delay/Seconds	= **45,041**

Step 2: Calculate No build vols with background growth PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol	PHF)	X delay per veh	= Total move. delay	= Total approach delay	MEV	Veh-Hrs Delay	CO2
Brimbal Ave	NB				=				=				=	= 0			
Brimbal Ave	SB				=				=				=	= 0	344	112602173.9	43425.308
	EB				=				=				=	= 0	3440	31278.38164	
SB Ramps	WB	139	0.92	27.9	= 4,206				=	51	0.92	0.0	= 0	= 4,206	860000		
													Total Intersection Delay/Seconds	= **4,206**	0.86		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM): AM Total Intersection Delay: 45,041

Step 4: Calculate the existing AM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol	PHF)	X delay per veh	= Total move. delay	= Total approach delay	MEV	Veh-Hrs Delay	CO2
Brimbal Ave	NB				=				=				=	= 0			
Brimbal Ave	SB				=				=				=	= 0	467	53552717.39	20652.7385
	EB				=				=				=	= 0	4670	14875.75483	
SB Ramps	WB	467	0.92	42.2	= 21,421				=				=	= 21,421	1167500		
													Total Intersection Delay/Seconds	= **21,421**	1.1675		

Step 5: Calculate vehicle delay in hours per day:

	(Delay in seconds	X Hours per day)	/ Seconds per hour	= Delay in hours / day
Existing peak hour intersection delay	(45,041	X 10)	/ 3600	= 125.1
Peak hour intersection delay w/ improvements	(21,421	X 10)	/ 3600	= 59.5

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	1.805	49.735	1414.950

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	125.1	0.507	0.226	6.223	177.029
With Improvements	59.5	0.241	0.107	2.959	84.194
Net Change		**-0.266**	**-0.118**	**-3.263**	**-92.836**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X Avg. weekdays per year	X Seasonal adj. factor	= Adj. net change in kg per year
Summer VOC Emissions	-0.266	X 250	X 1.0188	= **-67.730**
Summer NOx Emissions	-0.118	X 250	X 1.0188	= **-30.163**
Winter CO Emissions	-3.263	X 250	X 0.9812	= **-800.448**
Summer CO2 Emissions	-92.836	X 250	X 0.9812	**-22,772.570**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	-67.730	=	**$0**
Summer NOx		/	-30.163	=	**$0**
Winter CO		/	-800.448	=	**$0**
Summer CO2		/	-22,772.570	=	**$0**

Rte 128 SB Ramps at Brimbal Ave - Build

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2017

MPO:

Municipality: Beverly

Project: *Rte 128 SB Ramps at Brimbal Ave - Build*

Step 1: Calculate Existing AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Brimbal Ave	NB				=				=				=	= 0
Brimbal Ave	SB				=				=				=	= 0
	EB				=				=				=	= 0
SB Ramps	WB	288	0.92	18.5	= 5,791				=	56	0.92	10.7	= 651	= 6,443
													Total Intersection Delay/Seconds	= **6,443**

Step 2: Calculate Existing PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay	MEV	Veh-Hrs Delay	CO2
Brimbal Ave	NB				=				=				=	= 0			
Brimbal Ave	SB				=				=				=	= 0	344	16106521.74	6211.52011
	EB				=				=				=	= 0	3440	4474.033816	
SB Ramps	WB	139	0.92	13.8	= 2,080				=	51	0.92	0.0	= 0	= 2,080	860000		
													Total Intersection Delay/Seconds	= **2,080**	0.86		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM): AM Total Intersection Delay: 6,443

Step 4: Calculate the existing AM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay	MEV	Veh-Hrs Delay	CO2
Brimbal Ave	NB				=				=				=	= 0			
Brimbal Ave	SB				=				=				=	= 0			
	EB				=				=				=	= 0			
SB Ramps	WB	467	0.92	42.2	= 21,421				=				=	= 21,421			
													Total Intersection Delay/Seconds	= **21,421**			

Step 5: Calculate vehicle delay in hours per day:

	(Delay in seconds	X	Hours per day)	/	Seconds per hour	=	Delay in hours / day
Existing peak hour intersection delay	(6,443	X	10)	/	3600	=	17.9
Peak hour intersection delay w/ improvements	(21,421	X	10)	/	3600	=	59.5

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	17.9	0.073	0.032	0.890	25.322
With Improvements	59.5	0.241	0.107	2.959	84.194
Net Change		**0.169**	**0.075**	**2.069**	**58.872**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
Summer VOC Emissions	0.169	X	250	X	1.0188	=	**42.951**
Summer NOx Emissions	0.075	X	250	X	1.0188	=	**19.128**
Winter CO Emissions	2.069	X	250	X	0.9812	=	**507.604**
Summer CO2 Emissions	58.872	X	250	X	0.9812		**14,441.218**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	42.951	=	**$0**
Summer NOx		/	19.128	=	**$0**
Winter CO		/	507.604	=	**$0**
Summer CO2		/	14,441.218	=	**$0**

Connector Rd at Brimbal Ave - Option A Signals - Build

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2017

MPO:

Municipality: Beverly

Project: *Connector Rd at Brimbal Ave - Option A Signals - Build*

Step 1: Calculate Existing AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay
Brimbal Ave	NB	78	0.92	18.8	=	1,594	+ 590	0.92	7.7	=	4,938	+			=		=	6,532
Brimbal Ave	SB				=		+ 407	0.92	15.2	=	6,724	+ 297	0.92	4.8	=	1,550	=	8,274
Connector	EB	263	0.92	15.0	=	4,288	+			=		+ 269	0.92	11.2	=	3,275	=	7,563
	WB				=		+			=		+			=		=	0
																Total Intersection Delay/Seconds	=	**22,369**

Step 2: Calculate Existing PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay
Brimbal Ave	NB	102	0.92	17.3	=	1,918	+ 651	0.92	9.4	=	6,652	+			=		=	8,570
Brimbal Ave	SB				=		+ 290	0.92	16.0	=	5,043	+ 179	0.92	5.6	=	1,090	=	6,133
Connector	EB	349	0.92	15.8	=	5,994	+			=		+ 310	0.92	9.7	=	3,268	=	9,262
	WB				=		+			=		+			=		=	0
																Total Intersection Delay/Seconds	=	**23,965**

MEV	Veh-Hrs Delay	CO2
1,881	59911956.52	23105.1948
18810	16642.21014	
4702500		
4.7025		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM) PM

Total Intersection Delay: 23,965

Step 4: Calculate the existing PM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay
Brimbal Ave	NB	123	0.92	19.7	=	2,634	+ 730	0.92	13.7	=	10,871	+			=		=	13,504
Brimbal Ave	SB				=		+ 310	0.92	17.7	=	5,964	+ 197	0.92	5.4	=	1,156	=	7,120
Connector	EB	568	0.92	18.8	=	11,607	+			=		+ 338	0.92	10.0	=	3,674	=	15,281
	WB				=		+			=		+			=		=	0
																Total Intersection Delay/Seconds	=	**35,906**

MEV	Veh-Hrs Delay	CO2

Step 5: Calculate vehicle delay in hours per day:

	(Delay in seconds	X	Hours per day)	/	Seconds per hour	=	Delay in hours / day
Existing peak hour intersection delay	(23,965	X	10)	/	3600	=	66.6
Peak hour intersection delay w/ improvements	(35,906	X	10)	/	3600	=	99.7

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	66.6	0.270	0.120	3.311	94.192
With Improvements	99.7	0.404	0.180	4.960	141.125
Net Change		**0.134**	**0.060**	**1.650**	**46.933**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
Summer VOC Emissions	0.134	X	250	X	1.0188	=	**34.241**
Summer NOx Emissions	0.060	X	250	X	1.0188	=	**15.249**
Winter CO Emissions	1.650	X	250	X	0.9812	=	**404.666**
Summer CO2 Emissions	46.933	X	250	X	0.9812		**11,512.670**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	34.241	=	**$0**
Summer NOx		/	15.249	=	**$0**
Winter CO		/	404.666	=	**$0**
Summer CO2		/	11,512.670	=	**$0**

Connector Rd at Brimbal Ave - Option A Signals - No-Build

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2017

MPO:

Municipality: Beverly

Project: *Connector Rd at Brimbal Ave - Option A Signals - No-Build*

Step 1: Calculate No Build vols with background growth AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay
Brimbal Ave	NB	667	0.92	2.2	=	1,595	+			=		+			=		=	1,595
Brimbal Ave	SB				=		+	401	0.92	0.2	=	87	+	297	0.92	0.0	=	0	=	87
Connector	EB	263	0.92	884.7	=	252,909	+				=		+	265	0.92	19.2	=	5,530	=	258,439
	WB				=		+				=		+				=		=	0
																		Total Intersection Delay/Seconds	=	**260,121**

Step 2: Calculate No Build vols with background growth PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay	MEV	Veh-Hrs Delay	CO2
Brimbal Ave	NB	753	0.92	2.3	=	1,883	+			=		+			=		=	1,883			
Brimbal Ave	SB				=		+	290	0.92	0.5	=	158	+	179	0.92	0.0	=	0	=	158	1,881	861813043.5	332360.34
Connector	EB	349	0.92	884.7	=	335,609	+				=		+	310	0.92	21.0	=	7,076	=	342,685	18810	239392.5121	
	WB				=		+				=		+				=		=	0	4702500		
				assume AM delay														Total Intersection Delay/Seconds	=	**344,725**	4.7025		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM): PM

Total Intersection Delay: 344,725

Step 4: Calculate the existing PM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay	MEV	Veh-Hrs Delay	CO2
Brimbal Ave	NB	123	0.92	19.7	=	2,634	+	730	0.92	13.7	=	10,871	+				=		=	13,504			
Brimbal Ave	SB				=		+	310	0.92	17.7	=	5,964	+	197	0.92	5.4	=	1,156	=	7,120	2,266	89764402.17	34617.8646
Connector	EB	568	0.92	18.8	=	11,607	+				=		+	338	0.92	10.0	=	3,674	=	15,281	22660	24934.55616	
	WB				=		+				=		+				=		=	0	5665000		
																		Total Intersection Delay/Seconds	=	**35,906**	5.665		

Step 5: Calculate vehicle delay in hours per day:

	(	Delay in seconds	X	Hours per day)	/	Seconds per hour	=	Delay in hours / day
Existing peak hour intersection delay	(	344,725	X	10)	/	3600	=	957.6
Peak hour intersection delay w/ improvements	(	35,906	X	10)	/	3600	=	99.7

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	957.6	3.881	1.728	47.625	1,354.914
With Improvements	99.7	0.404	0.180	4.960	141.125
Net Change		**-3.477**	**-1.548**	**-42.664**	**-1,213.789**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
Summer VOC Emissions	-3.477	X	250	X	1.0188	=	**-885.539**
Summer NOx Emissions	-1.548	X	250	X	1.0188	=	**-394.374**
Winter CO Emissions	-42.664	X	250	X	0.9812	=	**-10,465.544**
Summer CO2 Emissions	-1,213.789	X	250	X	0.9812		**-297,742.476**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	-885.539	=	**$0**
Summer NOx		/	-394.374	=	**$0**
Winter CO		/	-10,465.544	=	**$0**
Summer CO2		/	-297,742.476	=	**$0**

Connector Rd at Sohier Rd - Option A Signals - Build

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2017

MPO:

Municipality: Beverly

Project: *Connector Rd at Sohier Rd - Option A Signals - Build*

Step 1: Calculate Existing AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Sohier Rd	NB				=	99	0.92	13.4	1,442	173	0.92	6.4	1,203	2,645
Sohier Rd	SB	363	0.92	22.7	8,957	423	0.92	6.5	2,989					11,945
	EB													0
Connector	WB	377	0.92	20.2	8,278						0.92		0	8,278
				assume PM delay									Total Intersection Delay/Seconds	**22,868**

Step 2: Calculate Existing PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay	MEV	Veh-Hrs Delay	CO2
Sohier Rd	NB				=	197	0.92	17.9	3,833	235	0.92	9.0	2,299	6,132			
Sohier Rd	SB	423	0.92	14.2	6,529	245	0.92	4.7	1,252					7,781	1,435	57170652.17	22048.004
	EB													0	14350	15880.73671	
Connector	WB	284	0.92	14.7	4,538						0.92		0	4,538	3587500		
													Total Intersection Delay/Seconds	**18,450**	3.5875		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM): AM

Total Intersection Delay: 22,868

Step 4: Calculate the existing AM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay	MEV	Veh-Hrs Delay	CO2
Sohier Rd	NB				=	123	0.92	15.5	2,072	209	0.92	6.5	1,477	3,549			
Sohier Rd	SB	376	0.92	24.6	10,054	627	0.92	10.2	6,952					17,005			
	EB													0			
Connector	WB	522	0.92	23.0	13,050						0.92		0	13,050			
								Combined delay under LT					Total Intersection Delay/Seconds	**33,604**			

Step 5: Calculate vehicle delay in hours per day:

	(Delay in seconds	X Hours per day)	/ Seconds per hour	= Delay in hours / day
Existing peak hour intersection delay	(22,868	X 10)	/ 3600	= 63.5
Peak hour intersection delay w/ improvements	(33,604	X 10)	/ 3600	= 93.3

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	63.5	0.257	0.115	3.159	89.882
With Improvements	93.3	0.378	0.168	4.643	132.079
Net Change		**0.121**	**0.054**	**1.483**	**42.197**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X Avg. weekdays per year	X Seasonal adj. factor	= Adj. net change in kg per year
Summer VOC Emissions	0.121	X 250	X 1.0188	= **30.786**
Summer NOx Emissions	0.054	X 250	X 1.0188	= **13.710**
Winter CO Emissions	1.483	X 250	X 0.9812	= **363.834**
Summer CO2 Emissions	42.197	X 250	X 0.9812	**10,350.996**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/ Adj. net change in kg per year	= First year cost per kilogram
Summer VOC		/ 30.786	= **$0**
Summer NOx		/ 13.710	= **$0**
Winter CO		/ 363.834	= **$0**
Summer CO2		/ 10,350.996	= **$0**

Connector Rd at Sohier Rd - Option A Signals - No-Build

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2017

MPO:

Municipality: Beverly

Project: *Connector Rd at Sohier Rd - Option A Signals - No-Build*

Step 1: Calculate no build vols with background growth AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay
Sohier Rd	NB				=		+ 99	0.92	0.0	=	0	+ 173	0.92	0.0	=	0	=	0
Sohier Rd	SB	363	0.92	10.2	=	4,025	+ 423	0.92	0.0	=	0	+			=		=	4,025
	EB				=		+			=		+			=		=	0
Connector	WB	302	0.92	358.4	=	117,649	+			=		+ 75	0.92	9.6	=	781	=	118,430
				assume PM delay												Total Intersection Delay/Seconds	=	**122,454**

Step 2: Calculate no build vols with background growth PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay	MEV	Veh-Hrs Delay	CO2
Sohier Rd	NB				=		+ 197	0.92	0.0	=	0	+ 235	0.92	0.0	=	0	=	0			
Sohier Rd	SB	423	0.92	10.5	=	4,828	+ 245	0.92	0.0	=	0	+			=		=	4,828	1,435	306135429.8	118061.889
	EB				=		+			=		+			=		=	0	14350	85037.6194	
Connector	WB	126	0.92	358.4	=	49,085	+			=		+ 158	0.92	10.6	=	1,816	=	50,902	3587500		
																Total Intersection Delay/Seconds	=	**55,729**	3.5875		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM): AM Total Intersection Delay: 122,454

Step 4: Calculate the existing AM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay	MEV	Veh-Hrs Delay	CO2
Sohier Rd	NB				=		+ 123	0.92	15.5	=	2,072	+ 209	0.92	6.5	=	1,477	=	3,549	1,857	84010869.57	32399.0005
Sohier Rd	SB	376	0.92	24.6	=	10,054	+ 627	0.92	10.2	=	6,952	+			=		=	17,005	18570	23336.35266	
	EB				=		+			=		+			=		=	0	4642500		
Connector	WB	522	0.92	23.0	=	13,050	+			=		+		0.92	=	0	=	13,050	4.6425		
									Combined delay under LT							Total Intersection Delay/Seconds	=	**33,604**			

Step 5: Calculate vehicle delay in hours per day:

	(	Delay in seconds	X	Hours per day)	/	Seconds per hour	=	Delay in hours / day
Existing peak hour intersection delay	(	122,454	X	10)	/	3600	=	340.2
Peak hour intersection delay w/ improvements	(	33,604	X	10)	/	3600	=	93.3

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	340.2	1.379	0.614	16.917	481.296
With Improvements	93.3	0.378	0.168	4.643	132.079
Net Change		**-1.000**	**-0.445**	**-12.275**	**-349.217**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
Summer VOC Emissions	-1.000	X	250	X	1.0188	=	**-254.777**
Summer NOx Emissions	-0.445	X	250	X	1.0188	=	**-113.465**
Winter CO Emissions	-12.275	X	250	X	0.9812	=	**-3,011.021**
Summer CO2 Emissions	-349.217	X	250	X	0.9812		**-85,662.888**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	-254.777	=	**$0**
Summer NOx		/	-113.465	=	**$0**
Winter CO		/	-3,011.021	=	**$0**
Summer CO2		/	-85,662.888	=	**$0**

Connector Rd at Sohier Rd - Option B Roundabouts - Build

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2017

MPO:

Municipality: Beverly

Project: *Connector Rd at Sohier Rd - Option B Roundabouts - Build*

Step 1: Calculate Existing AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay
Sohier Rd	NB				=		+ 99	0.92	6.0	=	646	+ 173	0.92	0.0	=	0	=	646
Sohier Rd	SB	363	0.92	10.0	=	3,946	+ 423	0.92	0.0	=	0	+			=		=	3,946
	EB				=		+			=		+			=		=	0
Connector	WB	377	0.92	6.0	=	2,459	+			=		+	0.92		=	0	=	2,459
				assume PM delay												Total Intersection Delay/Seconds	=	**7,050**

Step 2: Calculate Existing PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay	MEV	Veh-Hrs Delay	CO2
Sohier Rd	NB				=		+ 197	0.92	17.9	=	3,833	+ 235	0.92	9.0	=	2,299	=	6,132			
Sohier Rd	SB	423	0.92	14.2	=	6,529	+ 245	0.92	4.7	=	1,252	+			=		=	7,781	1,435	17625000	17788.4304
	EB				=		+			=		+			=		=	0	14350	4895.833333	
Connector	WB	284	0.92	14.7	=	4,538	+			=		+	0.92		=	0	=	4,538	3587500		
																Total Intersection Delay/Seconds	=	**18,450**	3.5875		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM): PM

Total Intersection Delay: 18,450

Step 4: Calculate the existing PM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay	MEV	Veh-Hrs Delay	CO2
Sohier Rd	NB				=		+ 123	0.92	15.5	=	2,072	+ 209	0.92	6.5	=	1,477	=	3,549			
Sohier Rd	SB	376	0.92	24.6	=	10,054	+ 627	0.92	10.2	=	6,952	+			=		=	17,005			
	EB				=		+			=		+			=		=	0			
Connector	WB	522	0.92	23.0	=	13,050	+			=		+	0.92		=	0	=	13,050			
									Combined delay under LT							Total Intersection Delay/Seconds	=	**33,604**			

Step 5: Calculate vehicle delay in hours per day:

	(	Delay in seconds	X	Hours per day)	/	Seconds per hour	=	Delay in hours / day
Existing peak hour intersection delay	(	18,450	X	10)	/	3600	=	51.3
Peak hour intersection delay w/ improvements	(	33,604	X	10)	/	3600	=	93.3

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	51.3	0.208	0.093	2.549	72.517
With Improvements	93.3	0.378	0.168	4.643	132.079
Net Change		**0.171**	**0.076**	**2.094**	**59.562**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
Summer VOC Emissions	0.171	X	250	X	1.0188	=	**43.454**
Summer NOx Emissions	0.076	X	250	X	1.0188	=	**19.352**
Winter CO Emissions	2.094	X	250	X	0.9812	=	**513.556**
Summer CO2 Emissions	59.562	X	250	X	0.9812		**14,610.570**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	43.454	=	**$0**
Summer NOx		/	19.352	=	**$0**
Winter CO		/	513.556	=	**$0**
Summer CO2		/	14,610.570	=	**$0**

Connector Rd at Brimbal Ave - Option B Roundabouts - Build

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2017

MPO:

Municipality: Beverly

Project: *Connector Rd at Brimbal Ave - Option B Roundabouts - Build*

Step 1: Calculate Existing AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	Thru + (Vol /	PHF)	X delay per veh	= Total move. delay	Right-Turns + (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Brimbal Ave	NB	78	0.92	18.8	= 1,594	+ 590	0.92	7.7	= 4,938	+			=	= 6,532
Brimbal Ave	SB				=	+ 407	0.92	15.2	= 6,724	+ 297	0.92	4.8	= 1,550	= 8,274
Connector	EB	263	0.92	15.0	= 4,288	+			=	+ 269	0.92	11.2	= 3,275	= 7,563
	WB				=	+			=	+			=	= 0
													Total Intersection Delay/Seconds	= **22,369**

Step 2: Calculate Existing PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	Thru + (Vol /	PHF)	X delay per veh	= Total move. delay	Right-Turns + (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay	MEV	Veh-Hrs Delay	CO2
Brimbal Ave	NB	102	0.92	6.0	= 665	+ 651	0.92		= 0	+			=	= 665			
Brimbal Ave	SB				=	+ 290	0.92	7.0	= 2,207	+ 179	0.92	7.0	= 1,362	= 3,568	1,881	18171195.65	21566.3576
Connector	EB	349	0.92	8.0	= 3,035	+			=	+ 310	0.92		= 0	= 3,035	18810	5047.554348	
	WB				=	+			=	+			=	= 0	4702500		
													Total Intersection Delay/Seconds	= **7,268**	4.7025		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM): AM

Total Intersection Delay: 22,369

Step 4: Calculate the existing AM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	Thru + (Vol /	PHF)	X delay per veh	= Total move. delay	Right-Turns + (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay	MEV	Veh-Hrs Delay	CO2
Brimbal Ave	NB	123	0.92	19.7	= 2,634	+ 730	0.92	13.7	= 10,871	+			=	= 13,504			
Brimbal Ave	SB				=	+ 310	0.92	17.7	= 5,964	+ 197	0.92	5.4	= 1,156	= 7,120			
Connector	EB	568	0.92	18.8	= 11,607	+			=	+ 338	0.92	10.0	= 3,674	= 15,281			
	WB				=	+			=	+			=	= 0			
													Total Intersection Delay/Seconds	= **35,906**			

Step 5: Calculate vehicle delay in hours per day:

	(Delay in seconds	X	Hours per day)	/	Seconds per hour	=	Delay in hours / day
Existing peak hour intersection delay	(22,369	X	10)	/	3600	=	62.1
Peak hour intersection delay w/ improvements	(35,906	X	10)	/	3600	=	99.7

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	62.1	0.252	0.112	3.090	87.918
With Improvements	99.7	0.404	0.180	4.960	141.125
Net Change		**0.152**	**0.068**	**1.870**	**53.206**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
Summer VOC Emissions	0.152	X	250	X	1.0188	=	**38.818**
Summer NOx Emissions	0.068	X	250	X	1.0188	=	**17.287**
Winter CO Emissions	1.870	X	250	X	0.9812	=	**458.756**
Summer CO2 Emissions	53.206	X	250	X	0.9812		**13,051.507**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	38.818	=	**$0**
Summer NOx		/	17.287	=	**$0**
Winter CO		/	458.756	=	**$0**
Summer CO2		/	13,051.507	=	**$0**

Connector Rd at Sohier Rd - Option B Roundabouts - No-Build

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2017

MPO:

Municipality: Beverly

Project: *Connector Rd at Sohier Rd - Option B Roundabouts - No-Build*

Step 1: Calculate no build vols with background growth AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay
Sohier Rd	NB				=	99	0.92	0.0	0	173	0.92	0.0	0	0
Sohier Rd	SB	363	0.92	10.2	4,025	423	0.92	0.0	0					4,025
	EB				=				=				=	0
Connector	WB	302	0.92	358.4	117,649				=	75	0.92	9.6	781	118,430
				assume PM delay									Total Intersection Delay/Seconds =	**122,454**

Step 2: Calculate no build vols with background growth PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay	MEV	Veh-Hrs Delay	CO2
Sohier Rd	NB				=	197	0.92	0.0	0	235	0.92	0.0	0	0			
Sohier Rd	SB	423	0.92	10.5	4,828	245	0.92	0.0	0					4,828	1,435	306135429.8	118061.889
	EB				=				=				=	0	14350	85037.6194	
Connector	WB	126	0.92	358.4	49,085				=	158	0.92	10.6	1,816	50,902	3587500		
													Total Intersection Delay/Seconds =	**55,729**	3.5875		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM): AM Total Intersection Delay: 122,454

Step 4: Calculate the existing AM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	+ Thru (Vol /	PHF)	X delay per veh	= Total move. delay	+ Right-Turns (Vol /	PHF)	X delay per veh	= Total move. delay	= Total approach delay	MEV	Veh-Hrs Delay	CO2
Sohier Rd	NB				=	123	0.92	7.1	949	209	0.92	0.0	0	949	1,857	53570380.43	20659.5502
Sohier Rd	SB	376	0.92	29.7	12,138	627	0.92	0.0	0					12,138	18570	14880.66123	
	EB				=				=				=	0	4642500		
Connector	WB	522	0.92	14.7	8,341				=		0.92		0	8,341	4.6425		
								Combined delay under LT					Total Intersection Delay/Seconds =	**21,428**			

Step 5: Calculate vehicle delay in hours per day:

	(Delay in seconds	X	Hours per day)	/	Seconds per hour	=	Delay in hours / day
Existing peak hour intersection delay	(122,454	X	10	) /	3600	=	340.2
Peak hour intersection delay w/ improvements	(21,428	X	10	) /	3600	=	59.5

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	**1.805**	**49.735**	**1414.950**

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	340.2	1.379	0.614	16.917	481.296
With Improvements	59.5	0.241	0.107	2.960	84.222
Net Change		**-1.137**	**-0.507**	**-13.957**	**-397.074**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
Summer VOC Emissions	-1.137	X	250	X	1.0188	=	**-289.692**
Summer NOx Emissions	-0.507	X	250	X	1.0188	=	**-129.014**
Winter CO Emissions	-13.957	X	250	X	0.9812	=	**-3,423.658**
Summer CO2 Emissions	-397.074	X	250	X	0.9812		**-97,402.339**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	-289.692	=	**$0**
Summer NOx		/	-129.014	=	**$0**
Winter CO		/	-3,423.658	=	**$0**
Summer CO2		/	-97,402.339	=	**$0**

Connector Rd at Brimbal Ave - Option B Roundabouts - No-Build

CMAQ Air Quality Analysis Worksheet for Traffic Flow and Intersection Improvements

FILL IN SHADED BOXES ONLY

TIP YEAR: 2017

MPO:

Municipality: Beverly

Project: *Connector Rd at Brimbal Ave - Option B Roundabouts - No-Build*

Step 1: Calculate No Build vols with background growth AM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+	Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+	Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay
Brimbal Ave	NB	667	0.92	2.2	=	1,595	+				=		+				=		=	1,595
Brimbal Ave	SB				=		+	401	0.92	0.2	=	87	+	297	0.92	0.0	=	0	=	87
Connector	EB	263	0.92	884.7	=	252,909	+				=		+	265	0.92	19.2	=	5,530	=	258,439
	WB				=		+				=		+				=		=	0
																		Total Intersection Delay/Seconds	=	**260,121**

Step 2: Calculate No Build vols with background growth PM Peak Hour Total Intersection Delay in Seconds:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+	Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+	Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay	MEV	Veh-Hrs Delay	CO2
Brimbal Ave	NB	753	0.92	2.3	=	1,883	+				=		+				=		=	1,883			
Brimbal Ave	SB				=		+	290	0.92	0.5	=	158	+	179	0.92	0.0	=	0	=	158	1,881	861813043.5	332360.34
Connector	EB	349	0.92	884.7	=	335,609	+				=		+	310	0.92	21.0	=	7,076	=	342,685	18810	239392.5121	
	WB				=		+				=		+				=		=	0	4702500		
				assume AM delay														Total Intersection Delay/Seconds	=	**344,725**	4.7025		

Step 3: The spreadsheet automatically chooses the peak hour with the longer total intersection delay for the next step in the analysis.

Peak Hour (AM/PM) PM

Total Intersection Delay: 344,725

Step 4: Calculate the existing PM Peak Hour Total Intersection Delay with Improvements:

Street Name	Dir	Left-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	+	Thru (Vol /	PHF)	X delay per veh	=	Total move. delay	+	Right-Turns (Vol /	PHF)	X delay per veh	=	Total move. delay	=	Total approach delay	MEV	Veh-Hrs Delay	CO2
Brimbal Ave	NB	123	0.92	9.0	=	1,203	+	730	0.92	0.0	=	0	+				=		=	1,203			
Brimbal Ave	SB				=		+	310	0.92	7.5	=	2,527	+	197	0.92	7.0	=	1,499	=	4,026	2,266	49345108.7	19030.0637
Connector	EB	568	0.92	23.5	=	14,509	+				=		+	338	0.92	0.0	=	0	=	14,509	22660	13706.97464	
	WB				=		+				=		+				=		=	0	5665000		
																		Total Intersection Delay/Seconds	=	**19,738**	5.665		

Step 5: Calculate vehicle delay in hours per day:

	(	Delay in seconds	X	Hours per day)	/	Seconds per hour	=	Delay in hours / day
Existing peak hour intersection delay	(	344,725	X	10)	/	3600	=	957.6
Peak hour intersection delay w/ improvements	(	19,738	X	10)	/	3600	=	54.8

Step 6: MOBILE 6 emission factors for arterial idling speed:

2016 Summer VOC Factor grams/hour	2016 Summer NOx Factor grams/hour	2016 Winter CO Factor grams/hour	2016 Summer CO2 Factor grams/hour
4.053	1.805	49.735	1414.950

Step 7: Calculate net emissions change in kilograms per day:

	Delay in Hours per Day	Summer VOC Emissions kilograms/day	Summer NOx Emissions kilograms/day	Winter CO Emissions kilograms/day	Summer CO2 Emissions kilograms/day
Existing Conditions	957.6	3.881	1.728	47.625	1,354.914
With Improvements	54.8	0.222	0.099	2.727	77.579
Net Change		**-3.659**	**-1.629**	**-44.898**	**-1,277.335**

Step 8: Calculate net emissions change in kilograms per year (seasonally adjusted)

	Net change per day (kg)	X	Avg. weekdays per year	X	Seasonal adj. factor	=	Adj. net change in kg per year
Summer VOC Emissions	-3.659	X	250	X	1.0188	=	**-931.900**
Summer NOx Emissions	-1.629	X	250	X	1.0188	=	**-415.021**
Winter CO Emissions	-44.898	X	250	X	0.9812	=	**-11,013.450**
Summer CO2 Emissions	-1,277.335	X	250	X	0.9812		**-313,330.277**

Calculate cost effectiveness (first year cost per kg of emissions reduced)

Emission	Project Cost	/	Adj. net change in kg per year	=	First year cost per kilogram
Summer VOC		/	-931.900	=	**$0**
Summer NOx		/	-415.021	=	**$0**
Winter CO		/	-11,013.450	=	**$0**
Summer CO2		/	-313,330.277	=	**$0**

3. Correspondence with Massachusetts Historical Commission, September 10, 2012

950 CMR: OFFICE OF THE SECRETARY OF THE COMMONWEALTH

APPENDIX A

MASSACHUSETTS HISTORICAL COMMISSION
220 MORRISSEY BOULEVARD
BOSTON, MASS. 02125
617-727-8470, FAX: 617-727-5128

PROJECT NOTIFICATION FORM

Project Name: Route 128, Exit 19 at Brimbal Avenue Interchange Improvement Project-Phase I

Location / Address: Route 128 at Sohier Road and Brimbal Avenue

City / Town: Beverly

Project Proponent

Name: William F. Scanlon, Jr., Mayor, City of Beverly

Address: 191 Cabot Street

City/Town/Zip/Telephone: Beverly, MA 978-605-2333

Agency license or funding for the project (list all licenses, permits, approvals, grants or other entitlements being sought from state and federal agencies).

Agency Name — Type of License or funding (specify)

See Attachment A for list of funding sources and permits.

Project Description (narrative):

See Attachment B for project description.

Does the project include demolition? If so, specify nature of demolition and describe the building(s) which are proposed for demolition. The project involves some demolition of existing roadway. No buildings will be demolished. The existing roadway to be demolished is illustrated in Attachment C.

Does the project include rehabilitation of any existing buildings? If so, specify nature of rehabilitation and describe the building(s) which are proposed for rehabilitation. No, the project does not include the rehabilitation of any buildings.

Does the project include new construction? If so, describe (attach plans and elevations if necessary).

The project includes the new construction of a connector road between Sohier Road and Brimbal Avenue. See Attachment D for plans.

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APPENDIX A (continued)

To the best of your knowledge, are any historic or archaeological properties known to exist within the project's area of potential impact? If so, specify. To the best of our knowledge there are no historic and/or archaeological properties known to exist within the project's area of potential impact.

What is the total acreage of the project area?

Woodland	-0-	acres	Productive Resources:		
Wetland	-0-	acres	Agriculture	-0-	acres
Floodplain	-0-	acres	Forestry	-0-	acres
Open space	-0-	acres	Mining/Extraction	-0-	acres
Developed	3.02	acres	Total Project Acreage	3.02	acres

What is the acreage of the proposed new construction? 1.4 acres (connector road)

What is the present land use of the project area? The project area is currently zoned as "IR" which is defined as restricted industrial, research, office district. However, the [illegible] construction will not directly impact businesses in the area other than to have a positive affect on traffic flow.

Please attach a copy of the section of the USGS quadrangle map which clearly marks the project location.

See Attachment E.

This Project Notification Form has been submitted to the MHC in compliance with 950 CMR 71.00.

Signature of Person submitting this form: [signature] Date: 10 SEPT 2012

Name: William F. Scanlon, Jr.

Address: 191 Cabot Street

City/Town/Zip: Beverly, 01915

Telephone: 978-921-6000

REGULATORY AUTHORITY

950 CMR 71.00: M.G.L. c. 9, §§ 26-27C as amended by St. 1988, c. 254.

ROUTE 128, EXIT 19 AT BRIMBAL AVENUE INTERCHANGE IMPROVEMENT PROJECT-PHASE I

ATTACHMENT A

List of Funding Sources and Permits

Funding source(s): MassWorks Infrastructure Program grant (application pending).

Permits:

- Phase I waiver/Expanded ENF.
- Order of Conditions relative to work in buffer zone.
- Utility relocation permit relative to likely relocation of overhead utilities.

ROUTE 128, EXIT 19 AT BRIMBAL AVENUE INTERCHANGE IMPROVEMENT PROJECT-PHASE I

ATTACHMENT B

Project Description.

The Brimbal Avenue/Route 128 Interchange Upgrade is a regional project, which has been carefully studied and analyzed for over a decade. Estimates indicate that completion of both phases of this project will create some 7,500 permanent, skilled jobs. The total investment to complete construction of both phases is estimated at $25,000,000. The project lies within an existing commercial area with both undeveloped and underutilized land. Appropriate zoning for the project is in place and the community is very receptive. This project will also significantly improve traffic safety and greatly reduce time and fuel wasted while vehicles sit idling in area neighborhoods and/or along Route 128. While the project will be physically located in Beverly, it has strong regional support. The North Shore Alliance for Economic Development, representing 30 communities, has repeatedly declared this project to be its number one priority. It has also been included in MAPC's North Shore Regional Strategic Plan.

A MassWorks Grant is being sought to cover the entire remaining cost of the first phase. Discussion with MEPA indicates the likelihood of a Phase One Waiver and an expanded ENF with a single EIR. Funding for the second phase would result from a DIF (District Improvement Financing) and Local Infrastructure Financing as well as hopefully another MassWorks Grant. Lack of needed funding is the reason this important project has not been accomplished.

Now for the first time, a plan has been created to provide the financing and realize the significant economic development potential of this area. The first phase will include widening a section of Brimbal Avenue, building a connector road between Brimbal Avenue and Sohier Road, installing several traffic signals, and extending some of Otis Road and part of Sohier Road. Projected improvements include 4,600 LF of roadway, 8,300 LF of sidewalks and 5,500 LF of drainage infrastructure. The design complies with Complete Streets Guidelines. The project would be advertised in March of 2013 with an anticipated construction start date of June, 2013. The projected completion date for Phase One is July of 2014. The project will immediately generate the development of a commercial and retail center in the area bordering Route 128 at the existing Northbound exit which is now encircled by the existing roadway configuration. A land swap between the Commonwealth and the developer (CEA Group) will be required. The developer understands and is supportive of the swap. Phase One will also allow for greatly improved access to Beverly Hospital's (BH) 48-acre campus. BH recently affiliated itself with Lahey Clinic. There is evidence that BH plans an on-site investment of $95,000,000 resulting in important job creation. Cell Signaling is a fast growing, international biotech business headquartered in Beverly now employing over 400 persons whose access will also be improved. A commuter rail station is within a half mile of the lower segment of the impacted area. Another factor which makes this area so desirable for both business location and housing is its proximity to Norwood Pond and other beautiful natural areas which the City respects and wishes to make every effort to preserve and make accessible to the public where reasonable.

ROUTE 128, EXIT 19 AT BRIMBAL AVENUE INTERCHANGE IMPROVEMENT PROJECT-PHASE I

ATTACHMENT C

Illustration of Roadway to be Demolished

TO
BE
MOUS

Prepared For:

City of Beverly

Data compiled from the following source:
Office of Geographic Information (MassGIS),
Commonwealth of Massachusetts,
Information Technology Division

- USGS Color Ortho Imagery: (2008/2009)

Approx. Scale in Feet

0 600

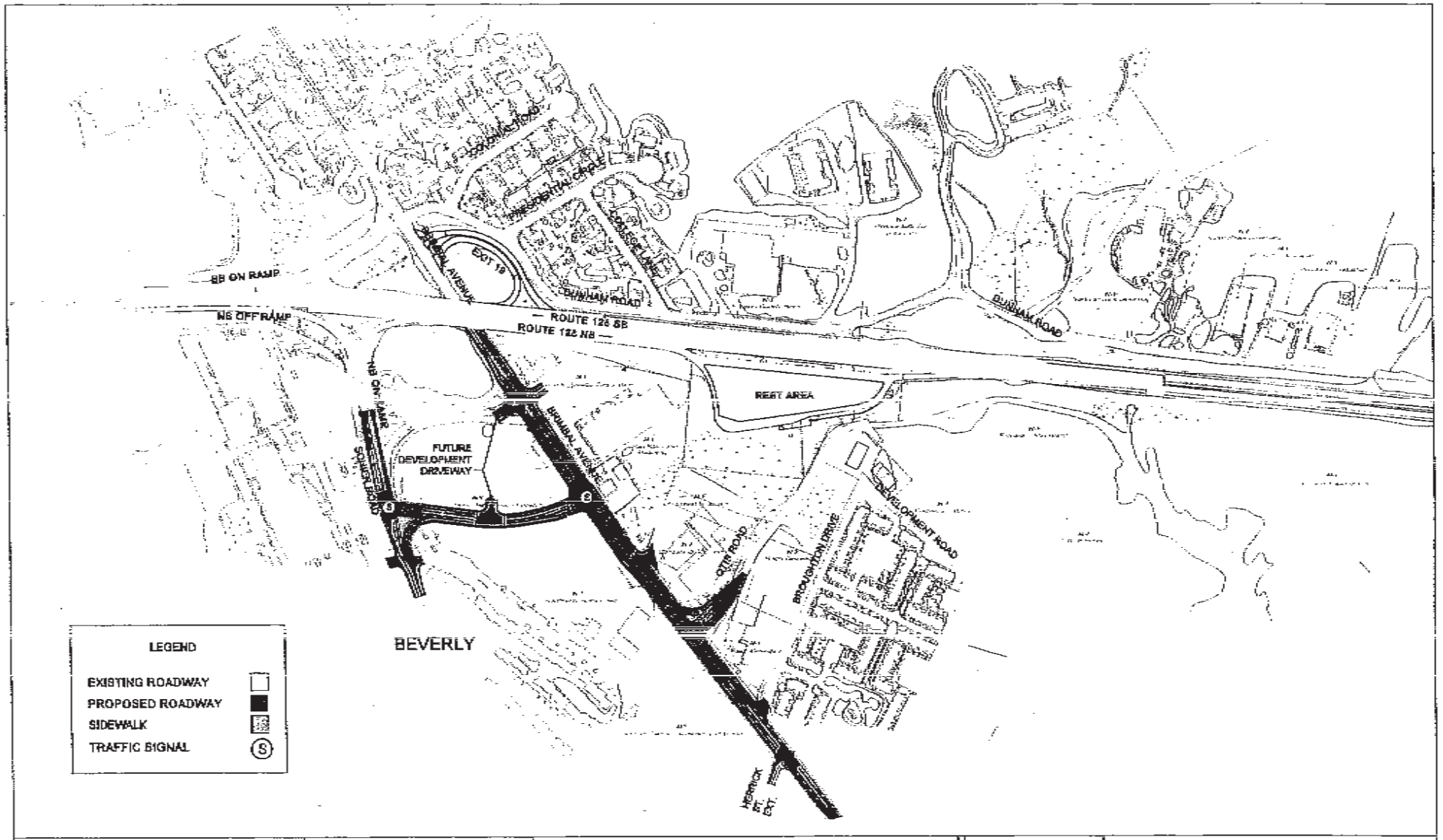
Route 128, Exit 19 at Brimbal Avenue
Interchange Improvements Project

DIGITAL ORTHOPHOTO LOCUS MAP

ROUTE 128, EXIT 19 AT BRIMBAL AVENUE INTERCHANGE IMPROVEMENT PROJECT-PHASE I

ATTACHMENT D

Design Plans for Roadway Improvements/Construction



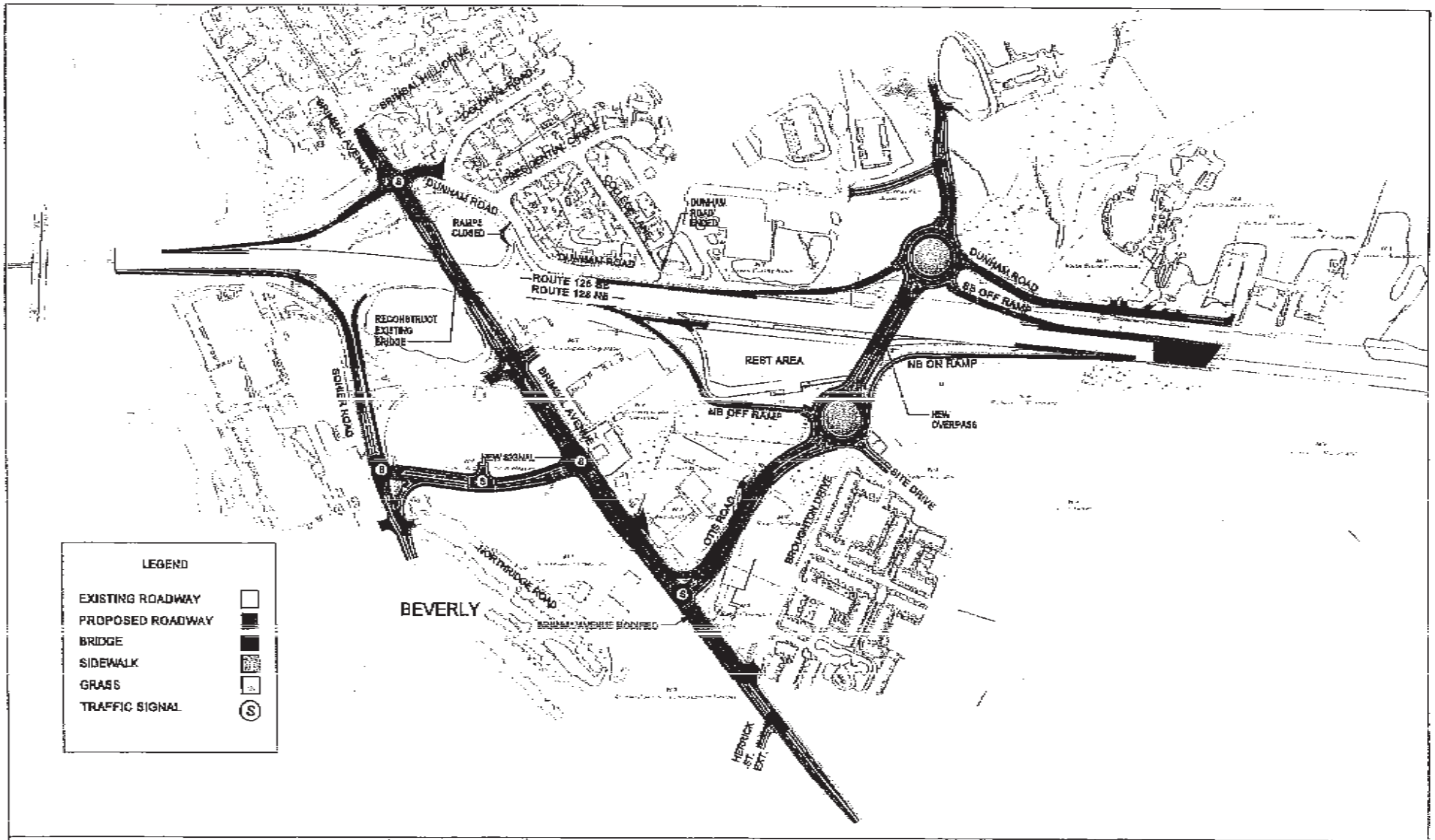
Prepared For:
City of Beverly

Prepared By:
JACOBS
SEPTEMBER 2012

ROUTE 128, EXIT 19 AT BRIMBAL AVENUE
INTERCHANGE IMPROVEMENTS PROJECT

N
Not to Scale

PHASE I CONCEPT



Prepared For:
City of Beverly

Prepared By:
JACOBS
SEPTEMBER 2012

ROUTE 128, EXIT 19 AT BRIMBAL AVENUE
INTERCHANGE IMPROVEMENTS PROJECT

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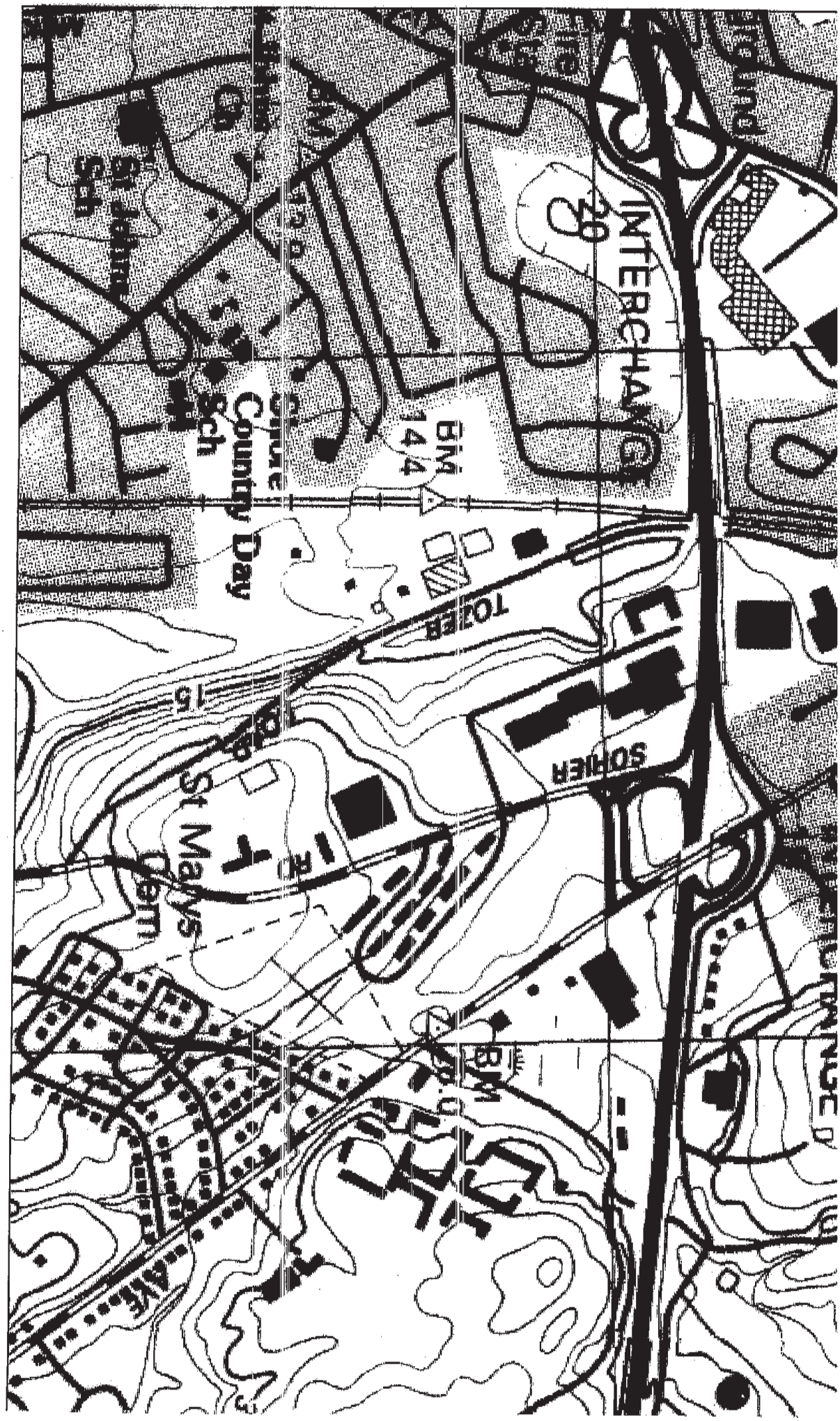
Not to Scale

FULL BUILD-OUT CONCEPT

ROUTE 128, EXIT 19 AT BRIMBAL AVENUE INTERCHANGE IMPROVEMENT PROJECT-PHASE I

ATTACHMENT E

USGS Quadrangle Map


INTERCHANGE
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BM
144
Spruce
County Day
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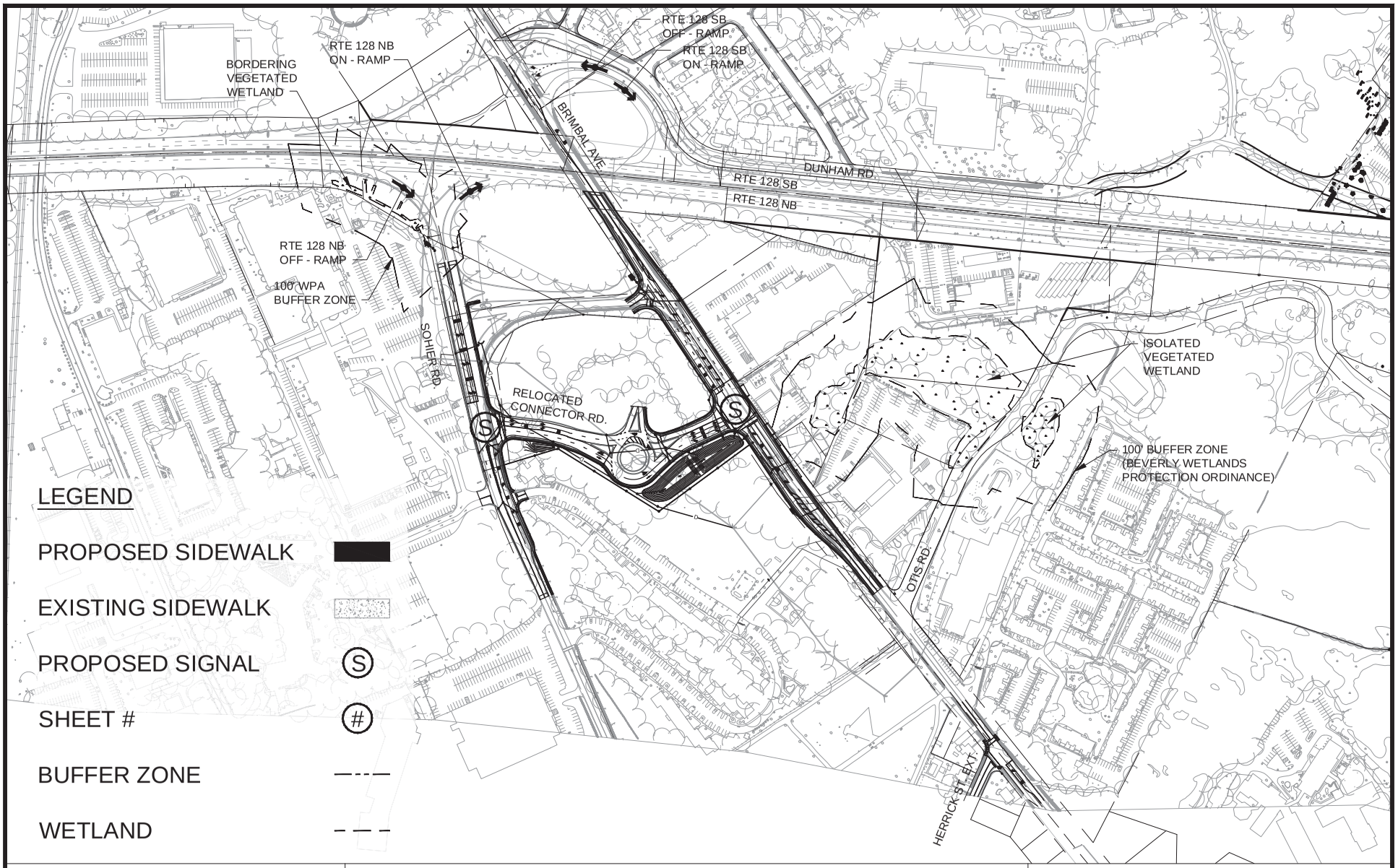
SOHIER
St Marys
Cem
AVE

4. Phase 1 Project Plans, May 2013



massDOT
Massachusetts Department of Transportation
Highway Division

City of Beverly

Approx. Scale:
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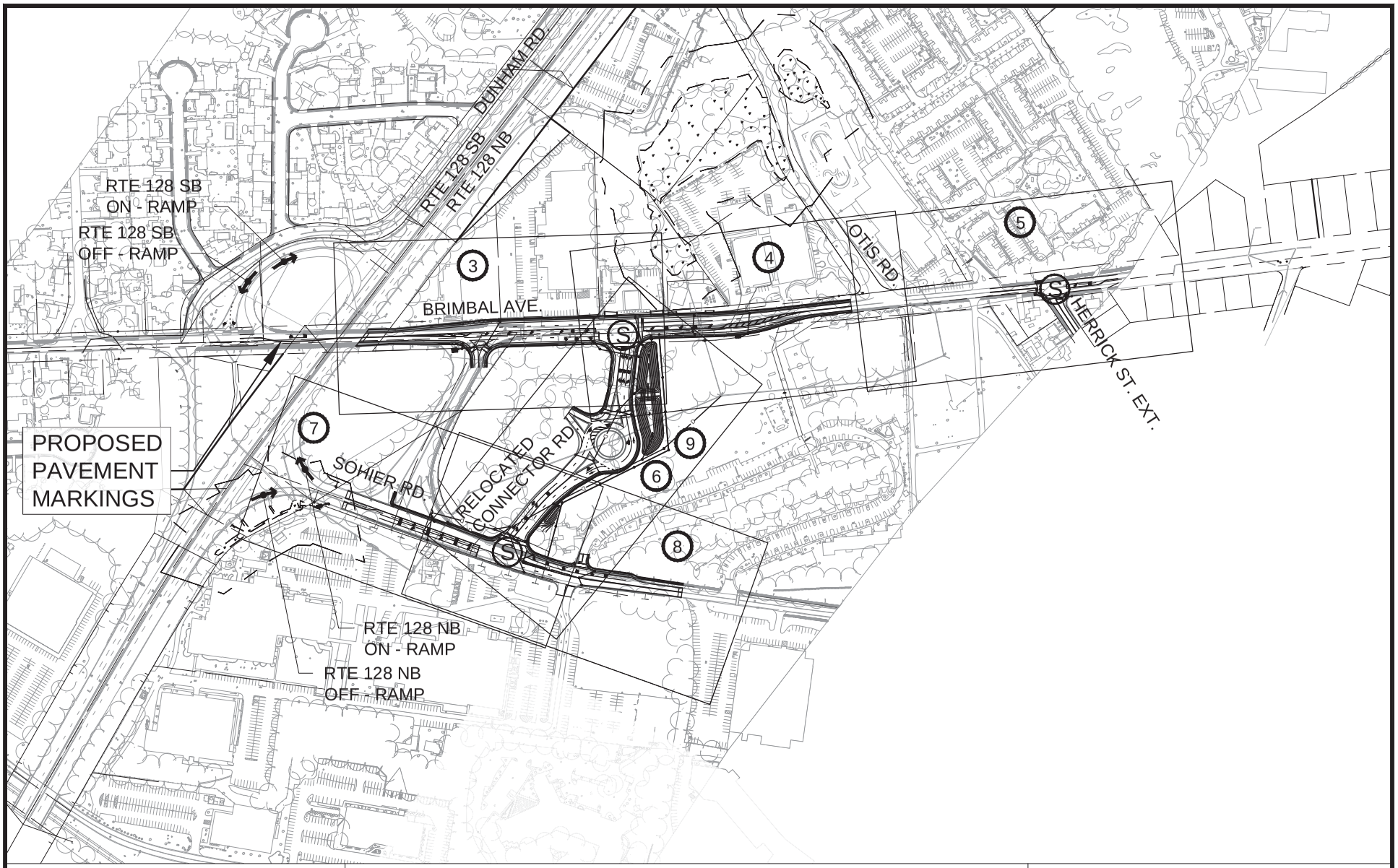
EENF

PROJECT PLANS
MAY 2013

N

Route 128, Exit 19 at Brimbal Avenue
Interchange Improvements Project

PHASE 1: Project Area Overview



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Highway Division

City of Beverly

Approx. Scale:
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PROJECT PLANS
MAY 2013

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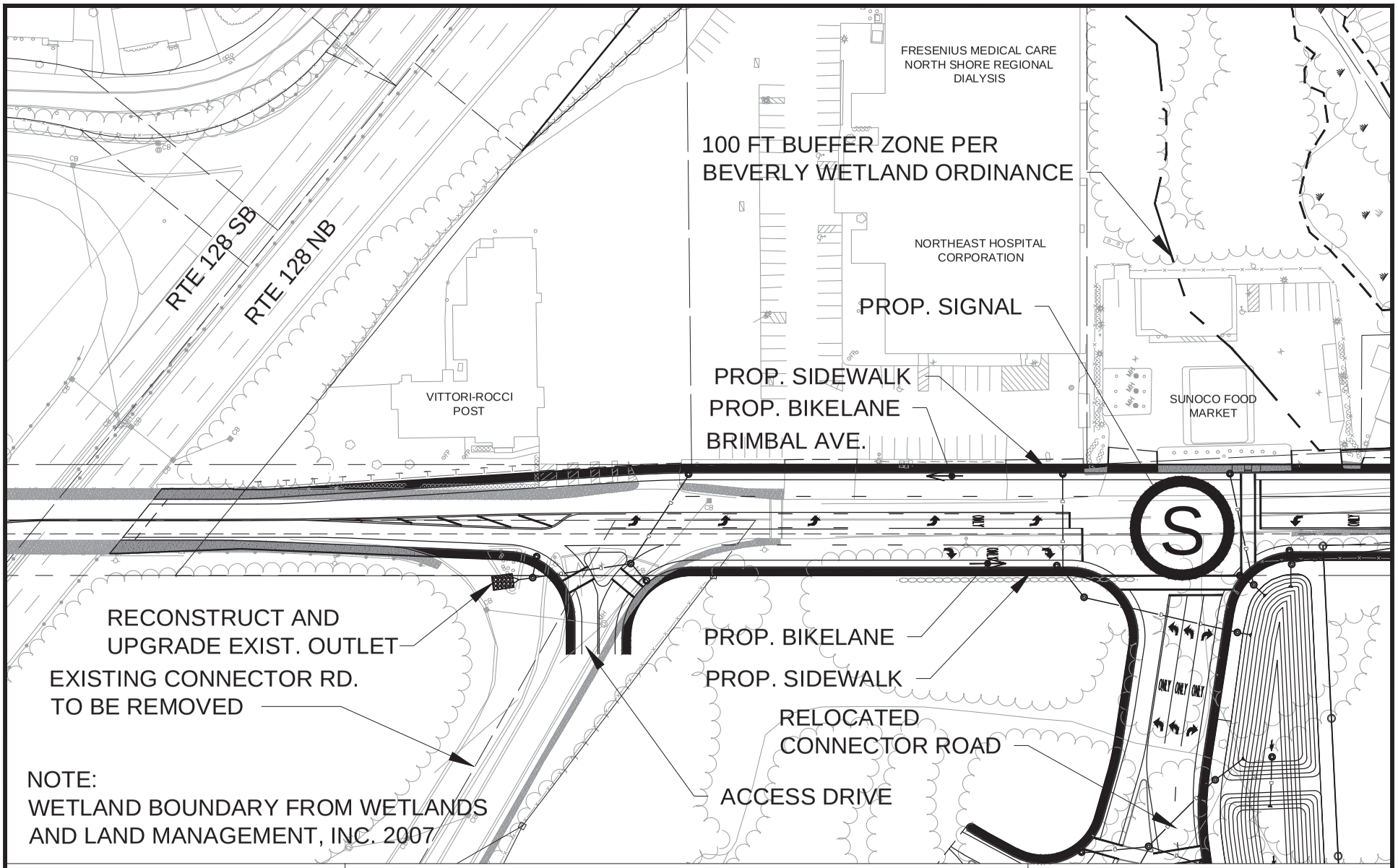
Route 128, Exit 19 at Brimbal Avenue
Interchange Improvements Project

PHASE 1: Key Plan



massDOT Massachusetts Department of Transportation Highway Division

City of Beverly

Approx. Scale:

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PROJECT PLANS

MAY 2013

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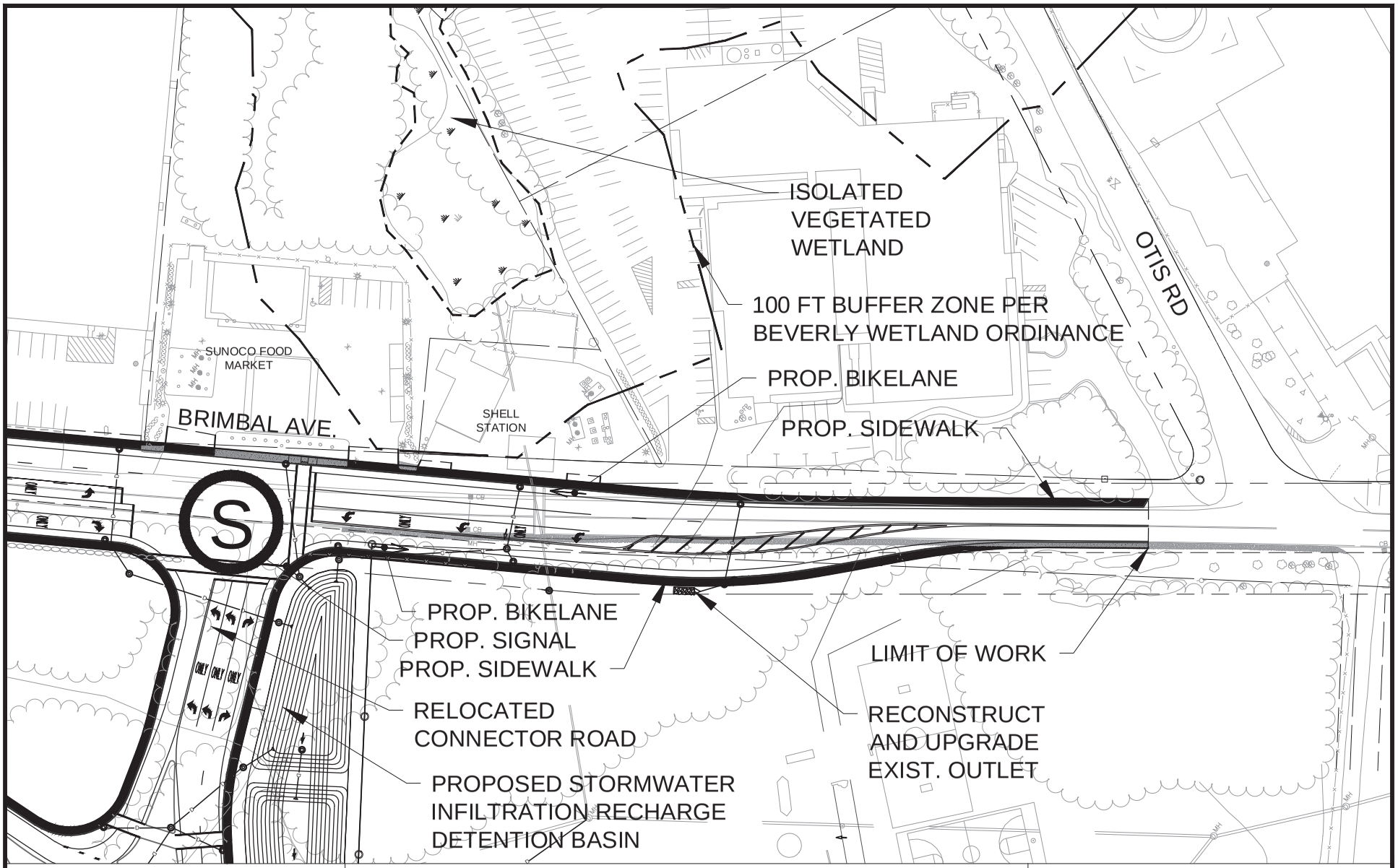
Route 128, Exit 19 at Brimbal Avenue
Interchange Improvements Project

PHASE 1: Signal Option



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Highway Division

City of Beverly

Approx. Scale:
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PROJECT PLANS
MAY 2013

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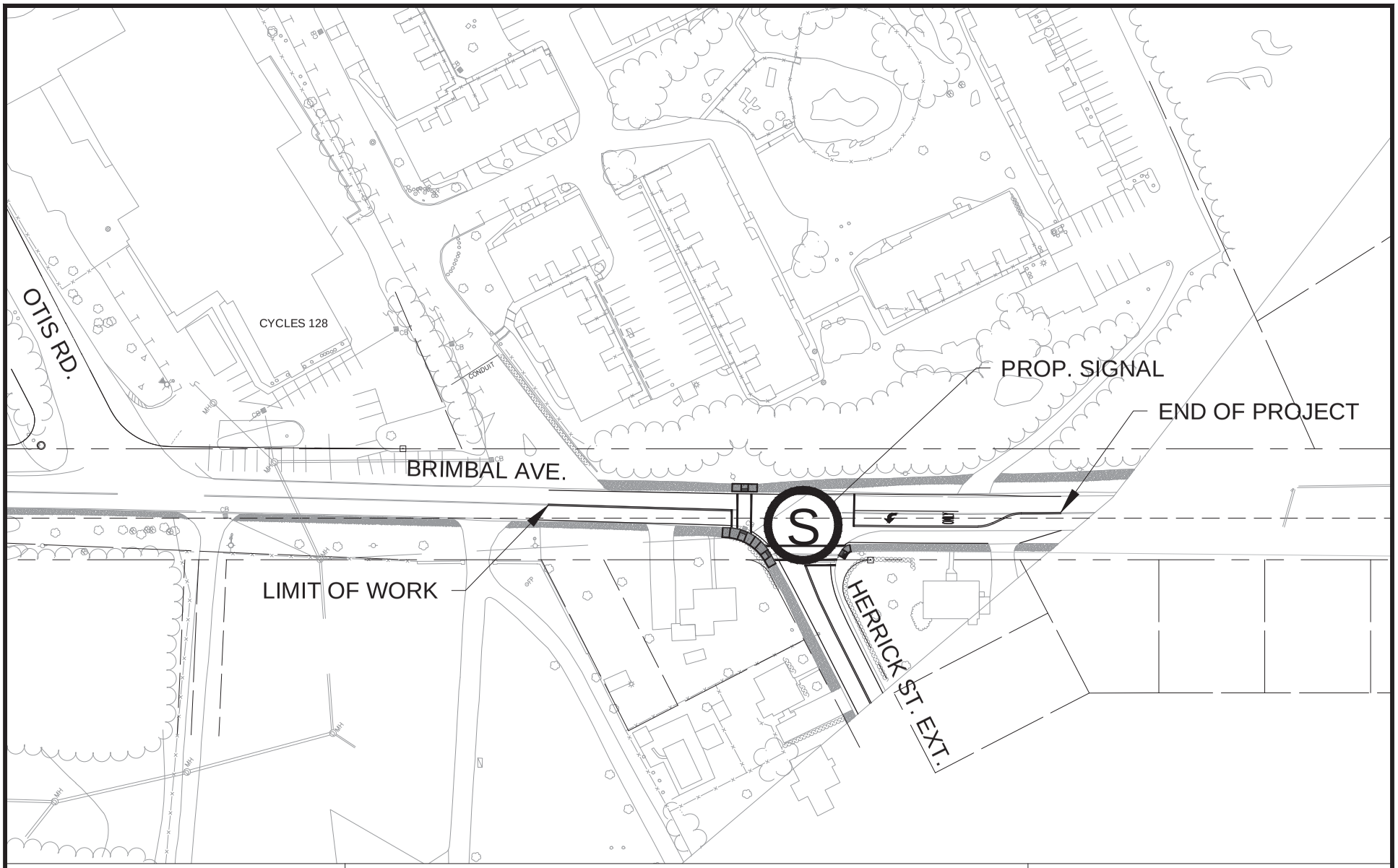
Route 128, Exit 19 at Brimbal Avenue
Interchange Improvements Project

PHASE 1: Signal Option



massDOT Massachusetts Department of Transportation Highway Division

City of Beverly

Approx. Scale:

0 50 100

EENF

PROJECT PLANS

MAY 2013

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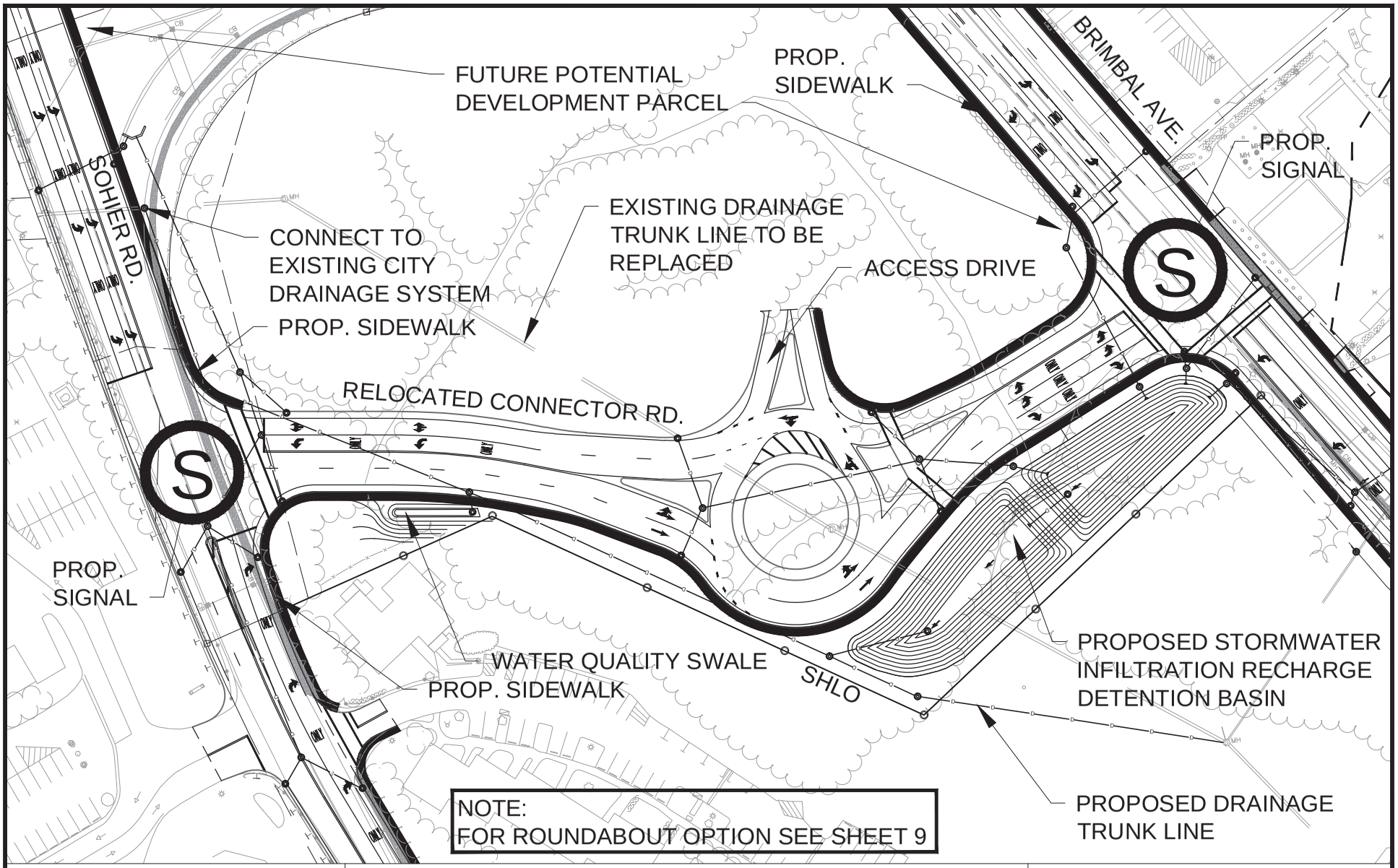
Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

PHASE 1: Signal and Roundabout Options



massDOT Massachusetts Department of Transportation Highway Division

City of Beverly

Approx. Scale: 0 50 100

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PROJECT PLANS

MAY 2013

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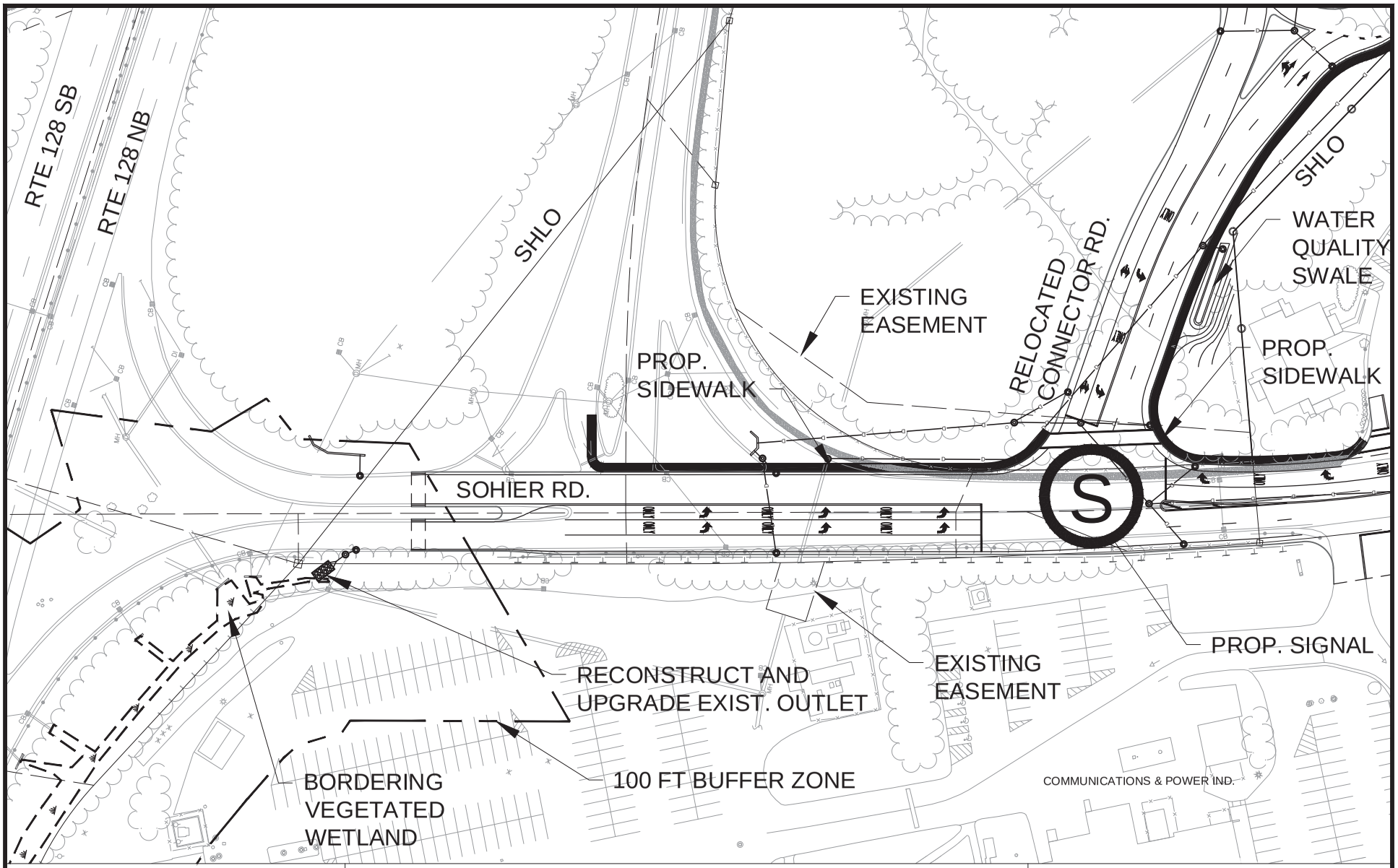
Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

PHASE 1: Signal Option



massDOT Massachusetts Department of Transportation Highway Division

City of Beverly

Approx. Scale: 0 50 100

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PROJECT PLANS
MAY 2013

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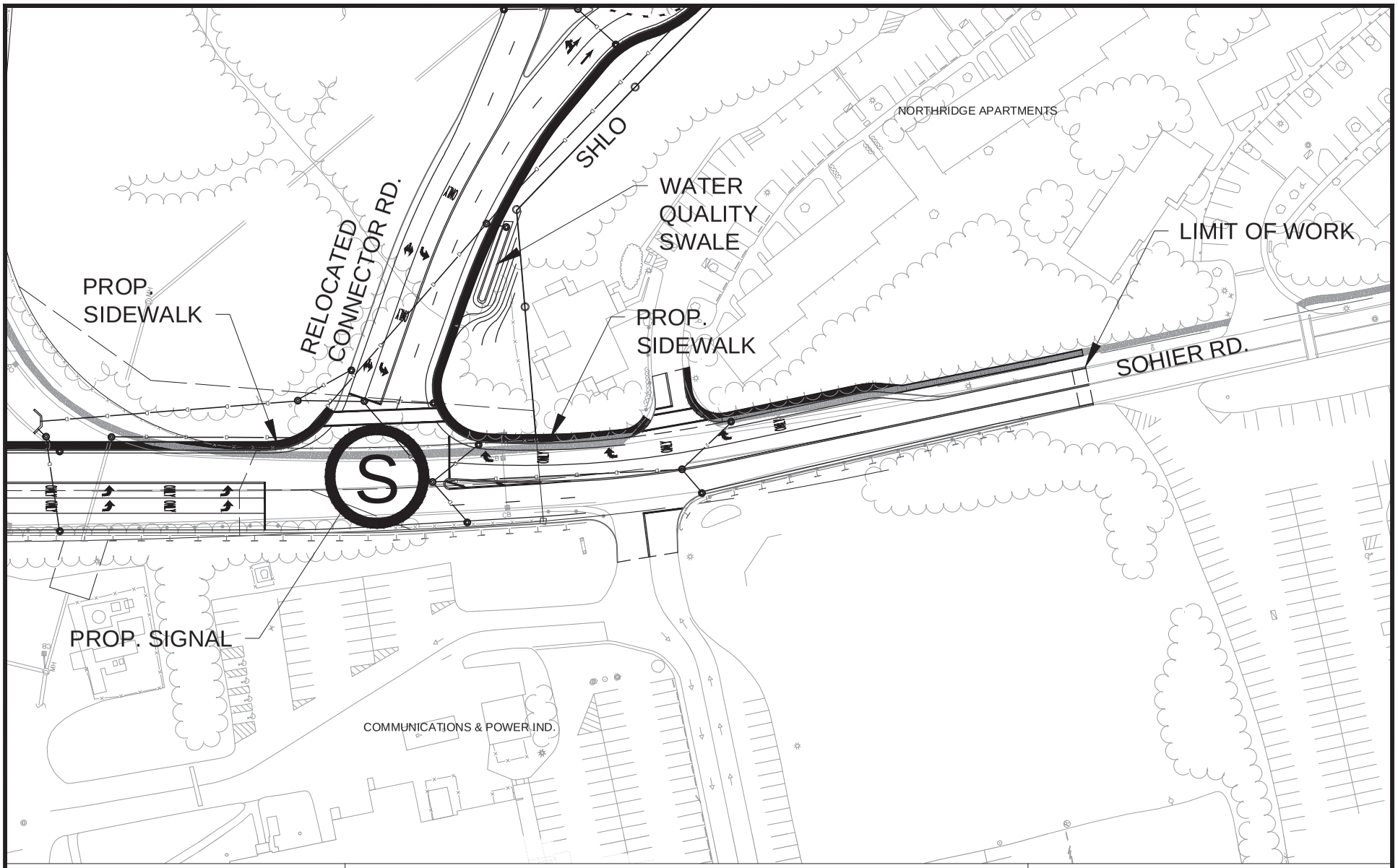
Route 128, Exit 19 at Brimbal Avenue Interchange Improvements Project

PHASE 1: Signal Option



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Highway Division

City of Beverly

Approx. Scale:
0 50 100

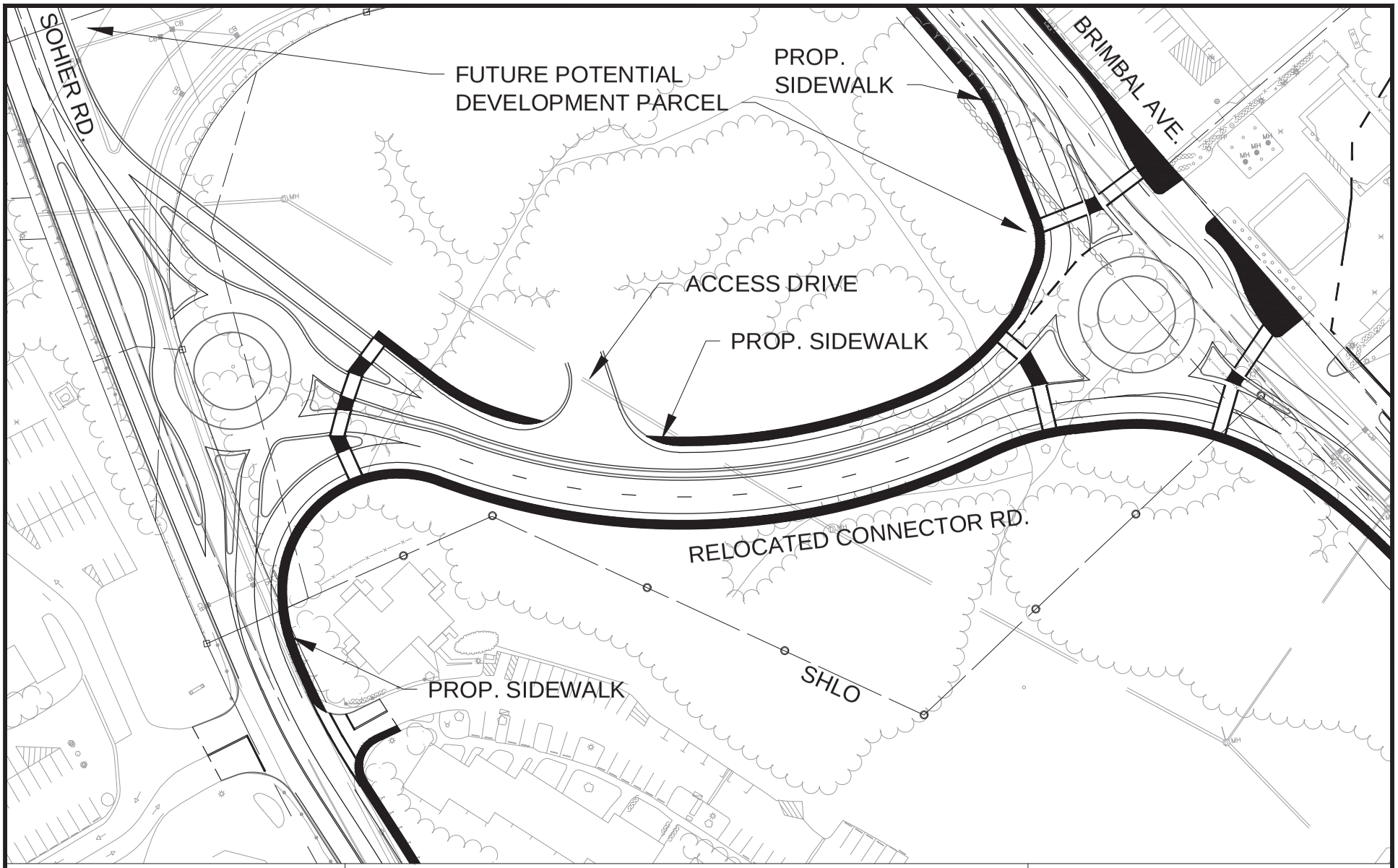
EENF

PROJECT PLANS
MAY 2013

N

Route 128, Exit 19 at Brimbal Avenue
Interchange Improvements Project

PHASE 1: Signal Option



massDOT
Massachusetts Department of Transportation
Highway Division

City of Beverly

Approx. Scale:
0 50 100

EENF

PROJECT PLANS
MAY 2013

N

Route 128, Exit 19 at Brimbal Avenue
Interchange Improvements Project

PHASE 1: Roundabout Option